CANADIAN MACHINERY AND MANUFACTURING NEWS

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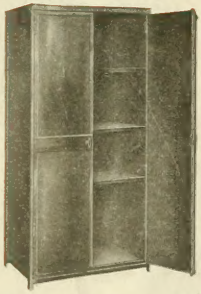
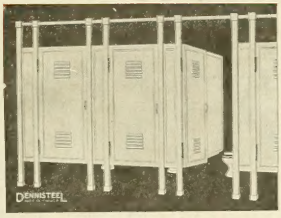
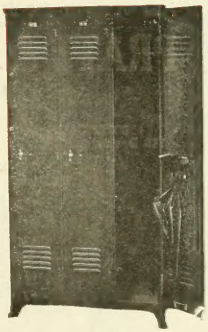
DENNISTEEL
Made in Canada



Material Cabinets



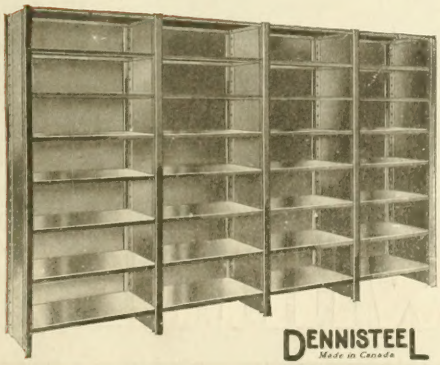
Lavatory Compartments



Lockers

EVERY Dennis product is produced by experts. We have many lines, but in each and every line we are specialists.

We are the largest makers in Canada of our principal lines—a position of leadership that has been attained, not by throw-together methods, but by long years of applied effort and improvement.



DENNISTEEL
Made in Canada

WE MAKE

Steel Lockers, Steel Cabinets, Steel Shelving, Steel Bins, Steel Chairs and Stools, etc.

Steel Lavatory Compartments, etc.

Commercial Wirework of all kinds.

Ornamental Iron and Bronze.

General Builders' Ironwork.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED
LONDON
CANADA

Halifax Montreal Ottawa Toronto
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All the Fine Qualities That Good Work Demands

Pratt & Whitney Small Tools enjoy an enviable reputation for excellence that has been well earned in the high production shops of the country. Where stamina as well as exceptional accuracy and precision are required P & W Tools have more than theld their own. Our line is complete. It includes taps, dies, milling cutters, reamers, punches, drills, etc., both of standard and special design and in sizes to suit every requirement.

Prompt service is assured at our nearest store, where P & W Small Tools are carried in stock for immediate delivery.

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OF CANADA

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WINDSOR
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VANCOUVER
B.C. Equipment Co.

HALIFAX
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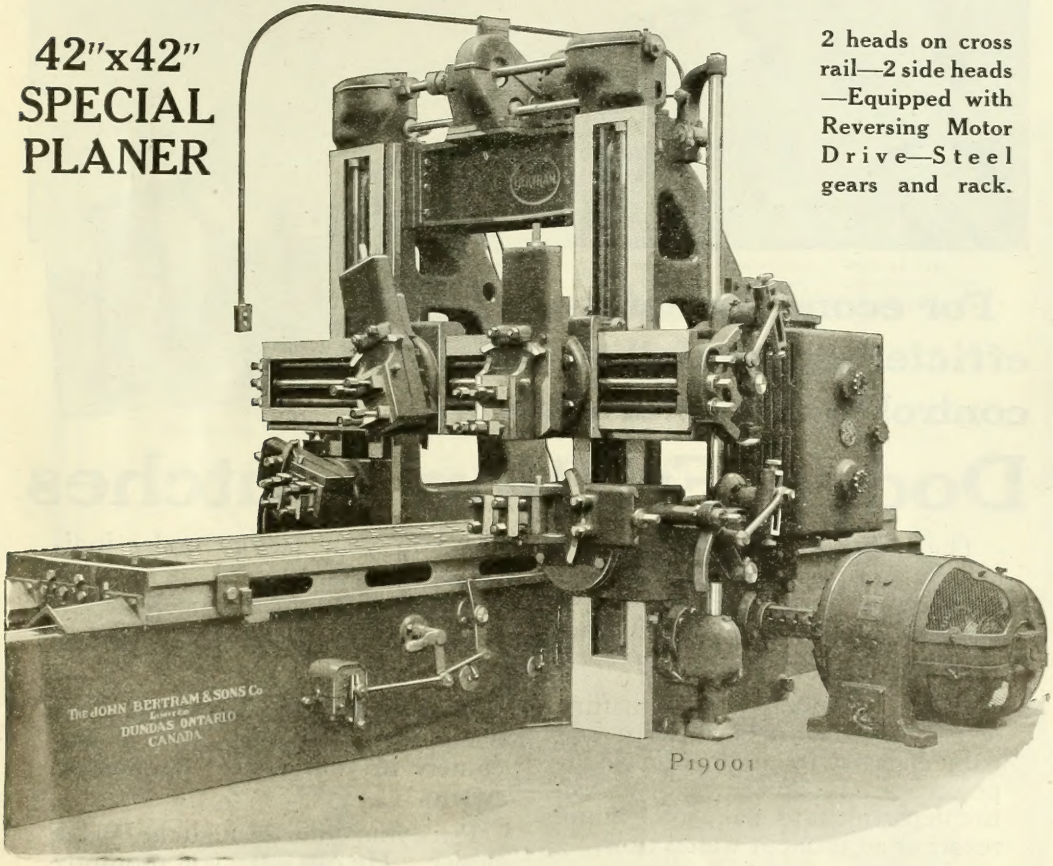
The BERTRAM Page

MACHINE TOOLS

42"x42" SPECIAL PLANER

2 heads on cross rail—2 side heads—Equipped with Reversing Motor Drive—Steel gears and rack.



The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

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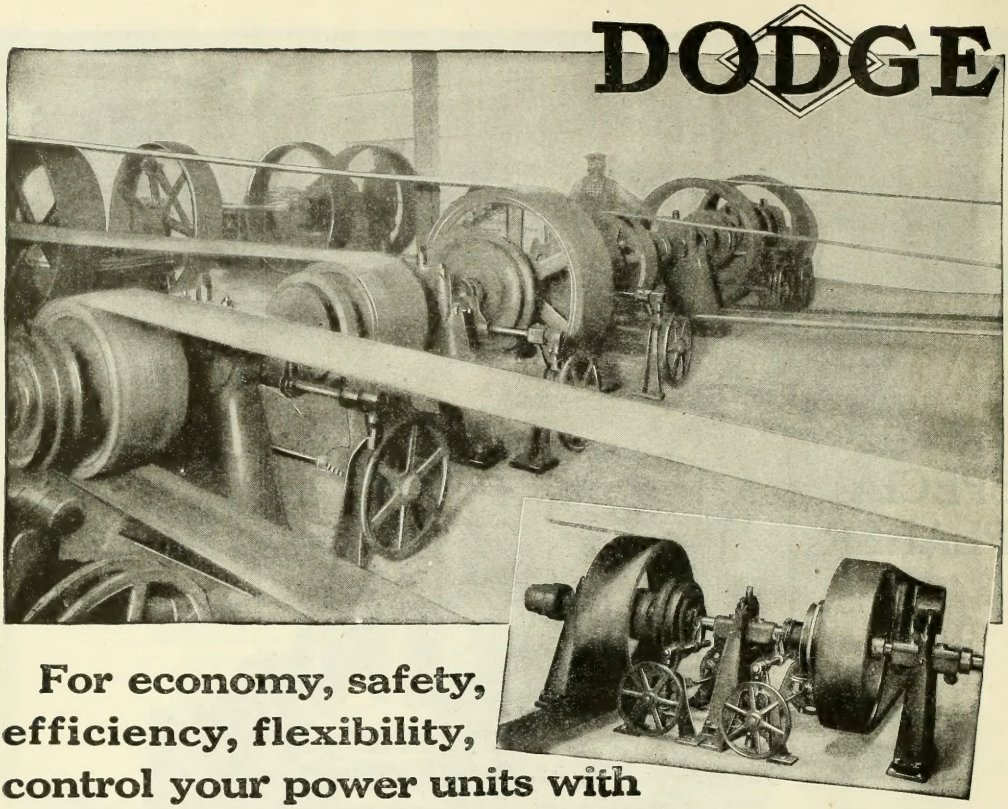


For economy, safety, efficiency, flexibility, control your power units with

Dodge Friction Clutches

The manufacturer who does not make use of every device to prevent waste of power and labor is soon going to find himself facing a balance on the wrong side of his ledger.

Every department, line of shafting or machine that runs when not actually engaged in production wastes power. Every shutdown of an entire department to make some minor repair or adjustment wastes time.

Dodge friction clutches put every department, line of shafting and machine in your factory under individual control.

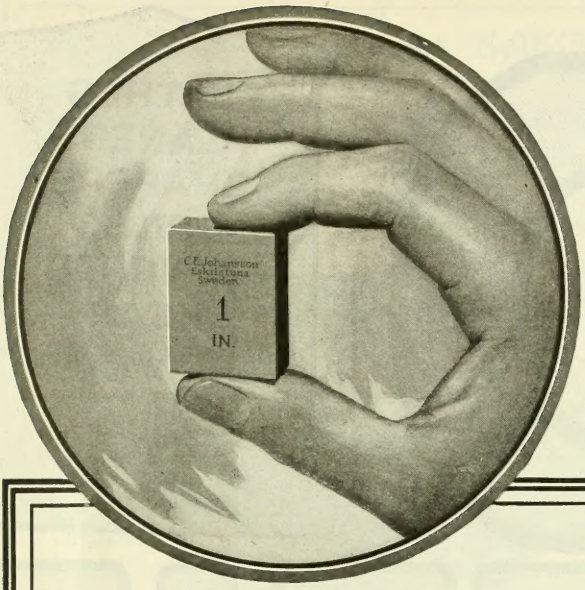
There's a Dodge clutch for every power unit from 1 H. P. to 1,000 or more H. P.

They will pay you bigger dividends than any other piece of machinery in your entire transmission system.

Place your order through the Dodge dealer. He can serve you promptly from his own stock or from one of our fifteen warehouses.

Dodge Manufacturing Company of Canada, Ltd.

Head Office and Works: Toronto, Ont. **Eastern Branch: Montreal, Que.**



Johansson FINISH

Errors and rejections are always costly; **to-day** they may prove fatal obstacles to success.

On the way back to "normalcy" first make sure you are right and then go ahead with a will.

Never before has there been a greater need for that comfortable assurance of accuracy which goes with Johansson Gages—blocks of unquestioned reliability and permanence.

As reference standards or as working gages in your tool room and inspection department, they give you **results** in the most direct way and in the shortest time.

Ask these Johansson dealers for details of standard sets, plug gages, snap gages and other Johansson tools.

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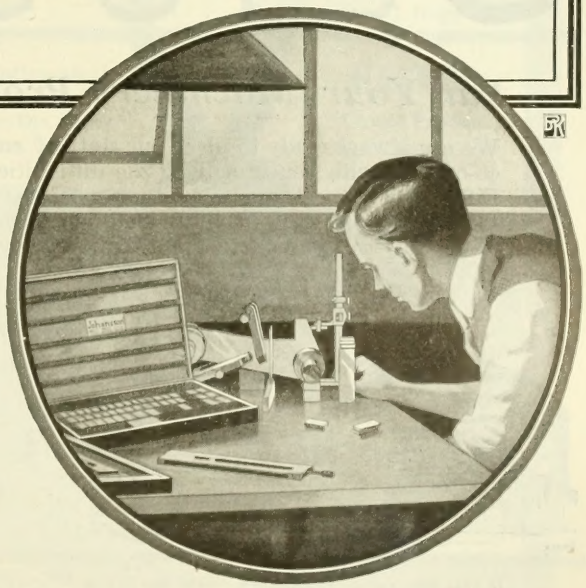
Williams & Wilson, Ltd.

TORONTO, Ont.
Aikenhead Hardware, Ltd.

WINDSOR, Ont.
Chas. A. Strelinger of Canada, Ltd.

C. E. JOHANSSON, INC.
Poughkeepsie, N.Y.

Johansson ACCURACY



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PETRIE

LATHES
PLANERS
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DRILLS
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SHEARS
HAMMERS

Everything in Machinery and Supplies

Put Your Machinery Problems in Our Hands

We are always ready to place our staff of engineers at your disposal. Let them co-operate with you in solving the difficulties that frequently arise in your shop. Fifty years' experience in handling machinery of all classes in Canada places us in a position to successfully treat the problems peculiar to Canadian manufacturers. How can our engineering staff serve you?

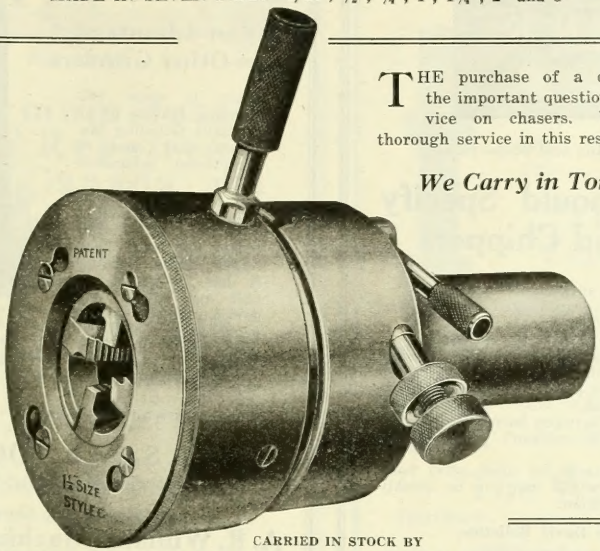
Remember, we handle only high-grade machinery and supplies and our exclusive buying and selling connections enable us to sell our lines at the most reasonable prices.

H. W. PETRIE, LIMITED
TORONTO and HAMILTON

The Coventry Patent Self-Opening Diehead

MADE IN SEVEN SIZES—5/16", ½", ¾", 1", 1¼", 2" and 3"

THE Coventry Diehead produces clean smooth threads, accurate in form and pitch. The Coventry chaser grinding system ensures exceptional life to the chasers and the greatest ease in grinding; all chasers are ground together on any type of surface grinder.



THE purchase of a diehead involves the important question of prompt service on chasers. We offer very thorough service in this respect.

We Carry in Toronto Stock

Chasers With
U.S. Standard Thread
Briggs Pipe Thread
A.S.M.E. Thread
S.A.E. Thread
Whitworth Thread

Section H. describes our Die-head and Chaser Grinding System in Detail. A copy will be sent on request.

CARRIED IN STOCK BY

ALFRED HERBERT LIMITED 1-3 JARVIS STREET, TORONTO

STEEL *for*
Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open - Hearth Steel on the Shortest Notice.

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Sales Offices:
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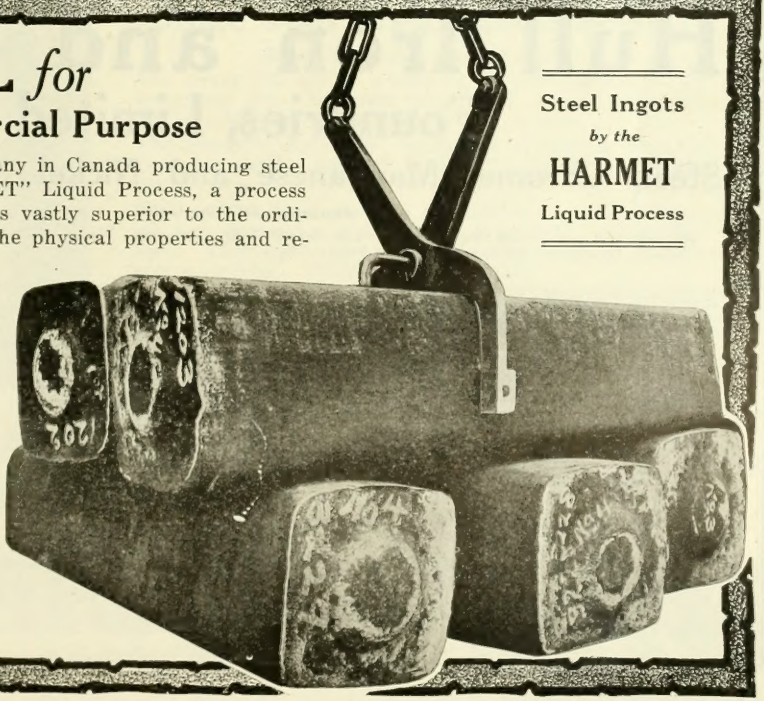
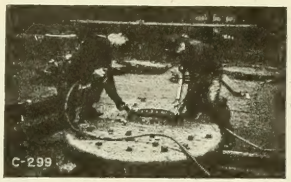
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process





Little David Chipping and Boiler Head

Why you should Specify Little David Chippers

1. One piece heat treated spring steel trigger.
2. Double heat treated, drop forged handle, sand blasted for ease in holding.
3. Offset valve, cannot be injured by piston.
4. Drop forged, heat treated and sand blasted barrel, strong and easy to hold.
5. Combination piston and poppet valve sensitive to control and will not leak.
6. A single ground joint between barrel and handle. Has no threads to strip and can't work loose or leak.
7. Barrel attached to handle by alloy steel bolts gives rigidity and strength and can be quickly disconnected for inspection.

Write for Little David Bulletins.

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Sydney Sherbrooke Montreal Toronto Cobalt
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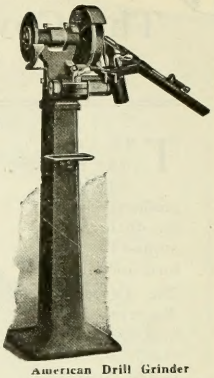
LA SALLE

Has an Advantage Over Other Grinders

There is some outstanding feature of all La Salle Grinding Machines that lends it exceptional productive ability.

The American Drill Grinder is especially adaptable for grinding twist, flat and three-lipped drills, because it has automatic lip rest and caliper jaw device, which assures proper clearance on all sizes of drills automatically. Send for descriptive matter covering our entire line of grinding machinery.



American Drill Grinder
For Wet or Dry Drill Grinding ⅛" to 2¼". Also ⅛" to 3½" dia.

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La Salle, Illinois, U.S.A.

Represented in Canada by

A. R. Williams Machinery Co., Ltd.
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Halifax St. John, N.B. Montreal Winnipeg Vancouver

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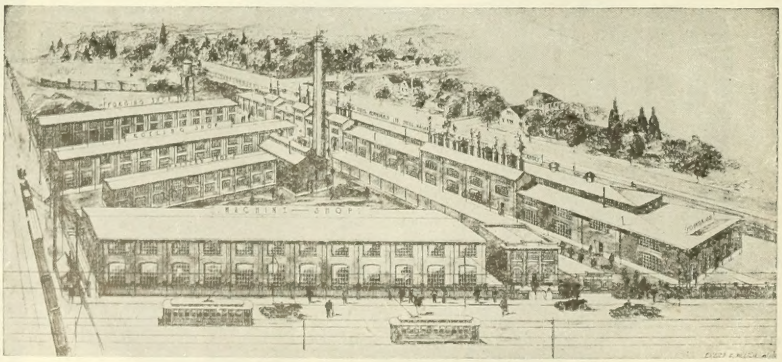
Steel, Chrome, Manganese and Nickel Steel Castings

Annealed and Unannealed

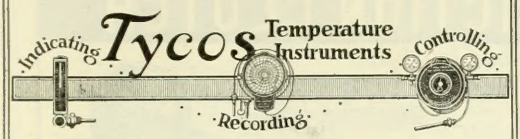
Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.



Machine-Moulded Gears

"H I S C O" machine-moulded gears, while requiring no pattern, insure accuracy, dependability, quality, and the price is minus the cost of patterns—which in these days of high prices of lumber is something to be considered.

Specify "HISCO" Products



Thermometers Now Repaired in Canada

Prompt
Efficient
Service

Competent instrument makers, ample equipment for overhauling and testing, indicating, recording and controlling temperature instruments, pyrometers, barometers, etc.

We would be pleased to receive visits and inquiries from those interested either in new equipment or repairs.

Taylor Instrument Companies

110-112 Church St., Toronto

There's a Tycos and Taylor Temperature Instrument for Every Purpose.

753

Steel Fingers Slip into The Flutes

Grip the broken tap and back it out before you've had time to count three times sixty.

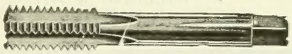
The Walton Tap Extractor

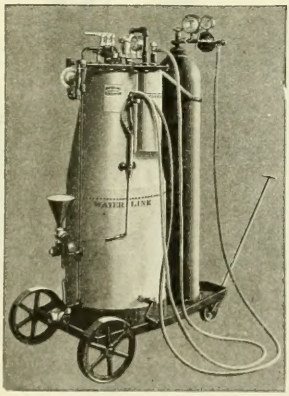
removes broken taps buried below the surface of the work without trouble or loss of time. It removes any broken tap without injuring the thread. It saves the casting or forging. Pays for itself over and over—often on the very first job.

How many do you want on trial?

The Walton Co.

Hartford - - - Conn.





Make Your Own Acetylene Gas

Save 2 to 4 cents per cubic foot

You never run out of acetylene in the middle of an important job. No high freight or express charges, haulage bills, or money tied up in cylinders.

The Imperial Automatic Acetylene Generator quickly pays for itself. Saves 2 to 4 cents per foot on every bit you use.

Turn on the torch and the gas begins to flow. Shut it off and generation stops. It is automatic. Absolutely safe. Thoroughly protected by safety locks so nothing can go wrong. Carbide to water type.

Imperial Welding Outfits

Oxy-acetylene Welding will save money in every plant. Makes repairs quickly. Helps in production. Our Imperial Universal Torch is EIGHT TORCHES IN ONE—a torch for every possible job. Write us for information on welding, our catalog and prices.

Send us the name of your distributor through whom you prefer to deal.

Imperial Automatic ACETYLENE GENERATOR

The Imperial Brass Mfg. Co.

503 S. Racine Ave., Chicago, Ill., U.S.A.

Makers of Imperial Welding, Cutting, Carbon and Lead Burning Equipment and Supplies

IMPERIAL BRASS PRODUCTS

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THE JOHNSON FRICTION CLUTCH

The Case Against the Countershaft

The old familiar countershaft drive, through cross belts and tight and loose pulleys, stands accused of the following offences against efficiency:

1. Involves needless equipment.
2. Costs too much to set up.
3. Prevents economical and systematic use of space.
4. Operates sluggishly.
5. Multiplies belt troubles and the resultant cost of upkeep.

Modern practice has discarded the antiquated countershaft for the simplicity and efficiency of the clutch drive direct from lineshaft..

Adopt the Johnson Lineshaft Drive

The economical, efficient and durable method of power transmission through friction control.

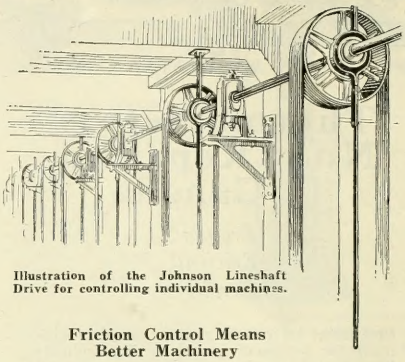
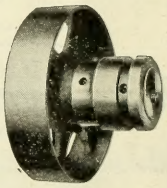


Illustration of the Johnson Lineshaft Drive for controlling individual machines.

Friction Control Means Better Machinery

Whether it is applied overhead or in the machine itself.



Write for our Booklet "Clutches as Applied to Machine Building" and our Yellow Catalog.

CANADIAN AGENTS:
WILLIAMS & WILSON, LTD., 84 Inspector Street, Montreal
CANADIAN FAIRBANKS-MORSE CO., LTD., Montreal, Toronto, Winnipeg

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

Heat Under Accurate Control

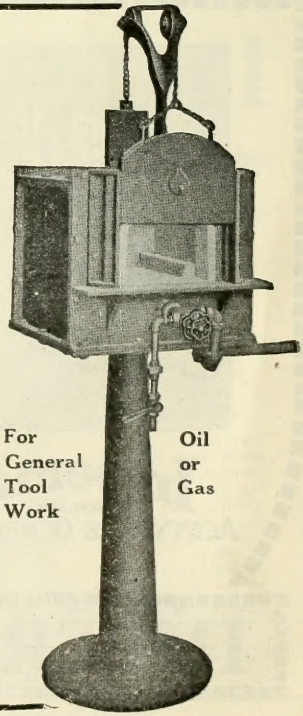
Here is an important factor in the heat treatment of metals. An intense heat, rapidly developed, and always under accurate control of the operator, is a feature that distinguishes

BELLEVUE FURNACES

These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counterbalanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.

Let us advise you about your heat-treating problems



For General Tool Work

Oil or Gas

Bellevue Industrial Furnace Company

Julius C. Hinz, President

703 Bellevue Ave. - Detroit, Mich.

Representative in Canada: H. W. PETRIE, LIMITED, Toronto, Canada

CANADIAN STEEL FOUNDRIES LIMITED

AMONG OUR PRODUCTS

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Bolsters
Couplers
Draft Arms
Locomotive Side Frames
Machinery Castings
Marine Castings
Rolling Mill Rolls
Wheel Centres

FERRO-ALLOYS

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Bucket Lips
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Dipper Teeth
Mixer Teeth
Special Trackwork

OTHER ALLOYS

Crank Pins
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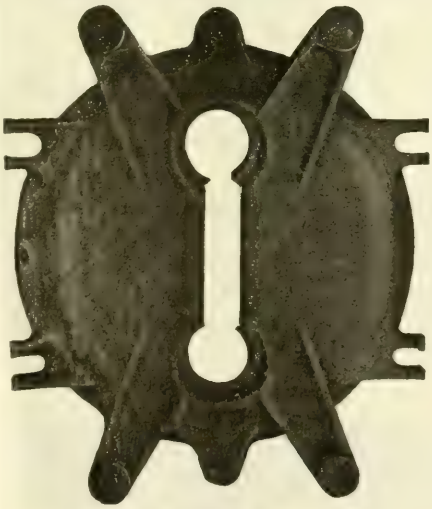
Rolls
Roll Shells

TRACKWORK

Diamond Crossings
Crosses
Frogs
Mates
Switches
Rail Braces
Guard Rail Clamps
Complete Intersection

This list is merely an indication

General Offices:
Transportation Building, Montreal



Cast Steel Circuit Breaker

Electrical Machinery

Parts of every description in cast steel

Small Forged Motor Shafts

Steel Sheets and Plates

Alloy Steel Gear Blanks

DOMINION FOUNDRIES & STEEL LIMITED

HAMILTON, CANADA

If interested tear out this page and place with letters to be answered.

Dependable Tools

Ford-Smith

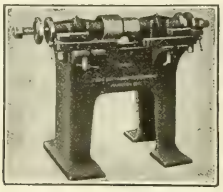
GRINDERS AND POLISHERS

Strong, durable, always-on-the job tools that handle a great variety of operations and go a long way toward reducing production costs.

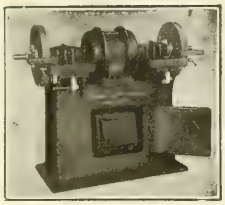
Ask for Catalogue

Motor Driven Grinders, Floor Grinders, Bench Grinders, Water Tool Grinders, Swing Grinders, Disc Grinders, Buffers, Polishers and Special Grinding Machinery.

Polishing Machine



General Purpose Floor Grinder



Motor Driven Floor Grinder

THE
FORD-SMITH MACHINE COMPANY, LIMITED
Hamilton, Ontario, Canada

Foreign Selling Agents:—W. E. Storey, London, England; McLeod & Co., Calcutta, India

Did You Know

That We Stock

BIT STOCK DRILLS

3-16" to 3-4", Whole Length 18"

for

Electrical Workers' Use?

These Drills are of that same sterling quality which characterizes the "Morse" Line.

Morse Twist Drill & Mach. Co.
NEW BEDFORD, MASS., U.S.A.

THE MORSE CHAIN CO.

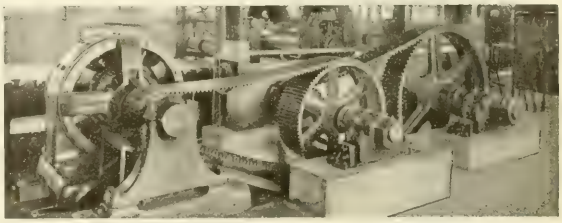
are the
Largest Manufacturers in the world
of
High Speed Silent Chains

Why?

Morse Chain possesses the exclusive
Rocker Joint

Frictionless—Requires no Oilbath.

Jones & Glassco (Reg'd.)
Canadian Agents
Montreal - - Toronto



80 H.P. Morse Drive to Rolls, reverses direction every 45 seconds

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

BROWN-BOGGS

B B

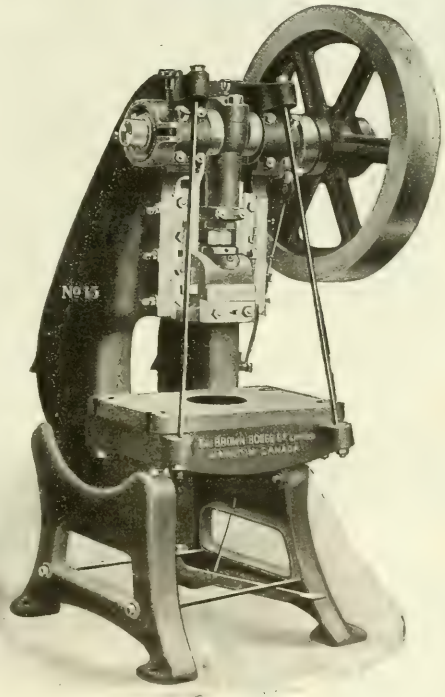
Built to Give Long, Hard Service

Output lost through breakdowns can't be made up by spurts of speed. The steady, continuous operation of efficient machines develops a volume production which cannot be attained by any other means.

Therefore, when you are buying a machine, buy one which will give you long, hard, continuous, efficient service.

The "B-B" line comprises tinsmiths' tools and sheet metal working machines of all kinds; canners' and evaporators' machinery, shears of every description, power presses for punching, forming, embossing, blanking.

We shall be glad to send you catalogs containing a full description of the machines and tools in which you are interested.

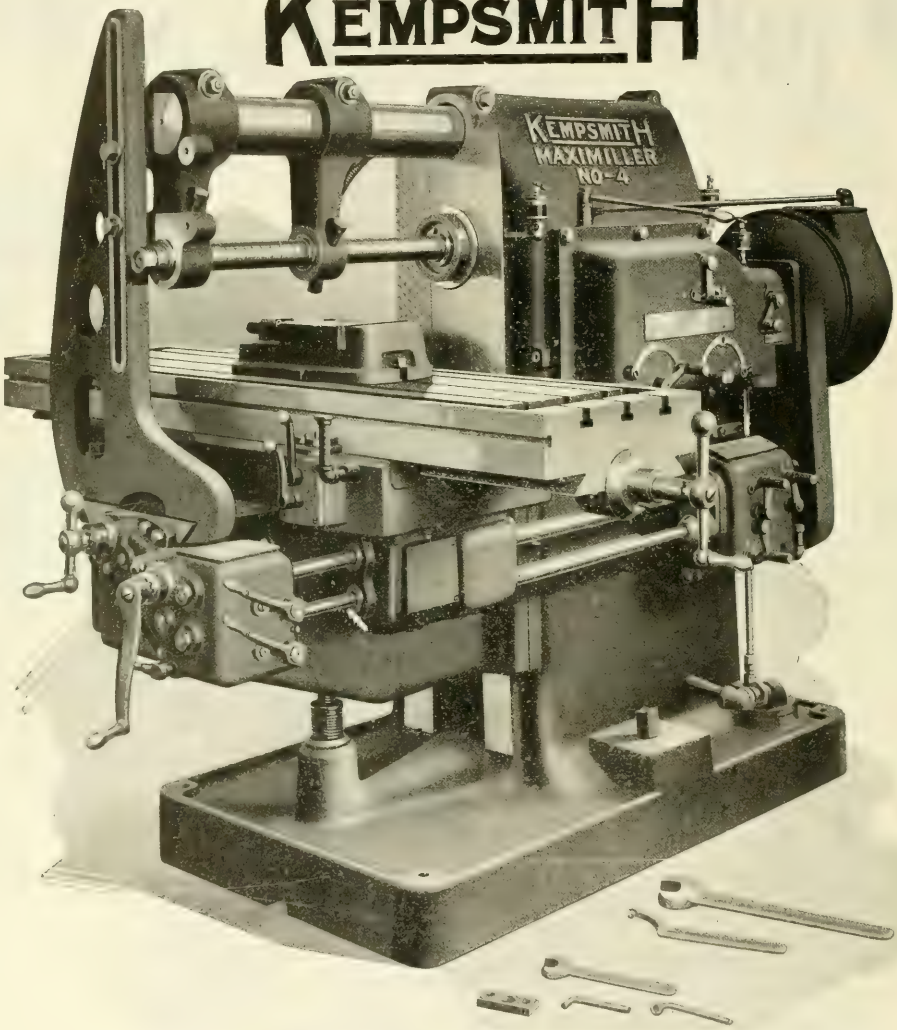


No. 15 Power Press

THE BROWN-BOGGS CO. LIMITED

HAMILTON, CANADA.

KEMPSMITH



KEMPSMITH No. 4 Plain Maximiller

A veritable maximum in milling machines embracing all Kempsmith patented features, permitting a maximum in production and efficiency. Write for particulars as to this machine.

THE KEMPSMITH MANUFACTURING CO.

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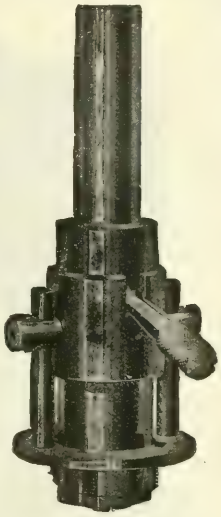
FOREIGN DEALERS:—American Trading Co., 25 Broad Street, New York, N.Y. (Japan); Barandiaran & Co., 3-Alameda, San Sebastian, Spain; Bevan & Edwards Pty., Ltd., 117 King Street, Melbourne, Australia; Blair, Reed & Company, Nathan's Bldg., Wellington, N.Z.; Bloxham, Edgar, 12 Rue Du Delta, Paris, France; 245 W. 12th St., New York City; L. S. Devos, Grand Central Palace, New York City; Herbert, Alfred, 54 Dey Street, New York City; Nielsen & Winther, Blegdamsvej 60, Copenhagen, Denmark; 24 Stone Street, New York City; Parke & Lacy Co., 60 Clarence Street, Sydney, N.S.W., Aust.; Selson Engr. Company, 85 Queen Victoria St., London, E.C., England; Corso Vittorio Emmanuele, 11, No. 9, Turin; 5 Piazzo Castella, Milan, Italy; 24 Stone Street, New York City; Pascual Teja, La Capuchinas, No. 65, Mexico, D.F.; Spliethoff, Beeuwkes & Co., Leuvehaven, W.Z., 159, Rotterdam, Holland; Turner, Hoare & Co., Ltd., Lansdowne Road, Post Box No. 195, Bombay, India; Charter & Gardiner, 55 Calle Echaque Santa Cruz, P.O. Box 1201, Manila, Philippine Is.; Societe Anonyme Belge Alfred Herbert, Rue De Laeken, 35a & 35b, Brussels, Belgium.

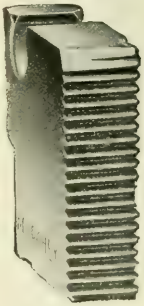
CANADIAN DEALERS:—The Geo. F. Foss Machinery & Supply Co., Limited, 305 St. James St., Montreal, Canada; General Supply Co., 38 Toronto St., Toronto, Canada.

Talk About Saving Time and Labor—

Murchey Collapsing Taps and Self-Opening Dies

will boost your production fifty per cent. and at the same time turn out better and more economical work than ordinary tools.





Murchey Tools are built for long, hard service. The fine materials and workmanship, their extremely simple design and rugged construction, enable clean, accurate threading under all conditions.

If you would experience a new kind of tap and die satisfaction send for a trial order of Murchey Taps and Dies.

Murchey Machine & Tool Company

75 Porter Street, Detroit, Mich.

Coats Machine Tool Co., London, Glasgow, Newcastle, Eng.
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The

SHERMAN DRESSER

This is a tool particularly designed for use on hard, coarse or large wheels upon which a diamond could not be used or upon which the Diamo-Carbo would not be economical.

It is provided with a protection hood which effectually protects the eyes of the user from flying particles. This protection hood is along the "Safety First" lines and is rapidly being adopted by all shops where the employee's safety is of first importance.

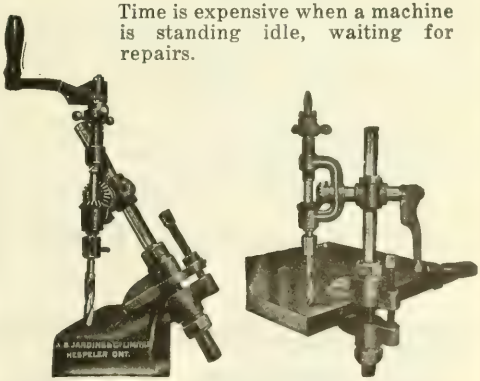
Write for complete catalog of our various dressers.

The Canadian Desmond-Stephan Mfg. Company, Limited

Hamilton - - Ontario

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net.

Sold by all Machinery and Supply Houses.

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

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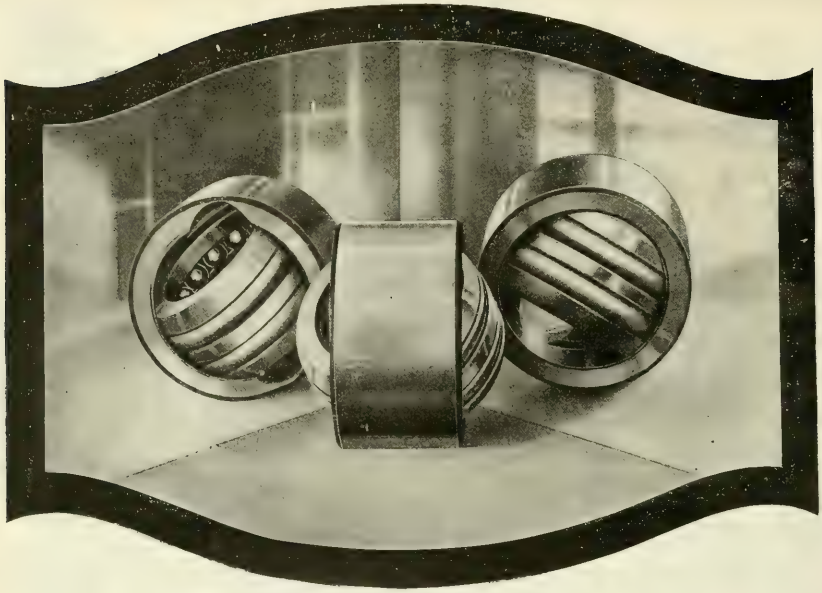

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Benefit from the World-Wide Experience of SKF Engineers

Are you faced with any of these problems

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—Variations in product due to lack of precision or wear of bearings

—Difficulty in adjusting machines

—Slow speed due to limitations of bearings or slipping of belts

—Belt trouble at high speed.

Your problems have most likely been solved before, somewhere, by SKF—in England, Sweden, Switzerland, United States, China, Japan or Canada. If not, SKF engineers conduct a laboratory which can solve it, and **will,** gladly, without cost to you.

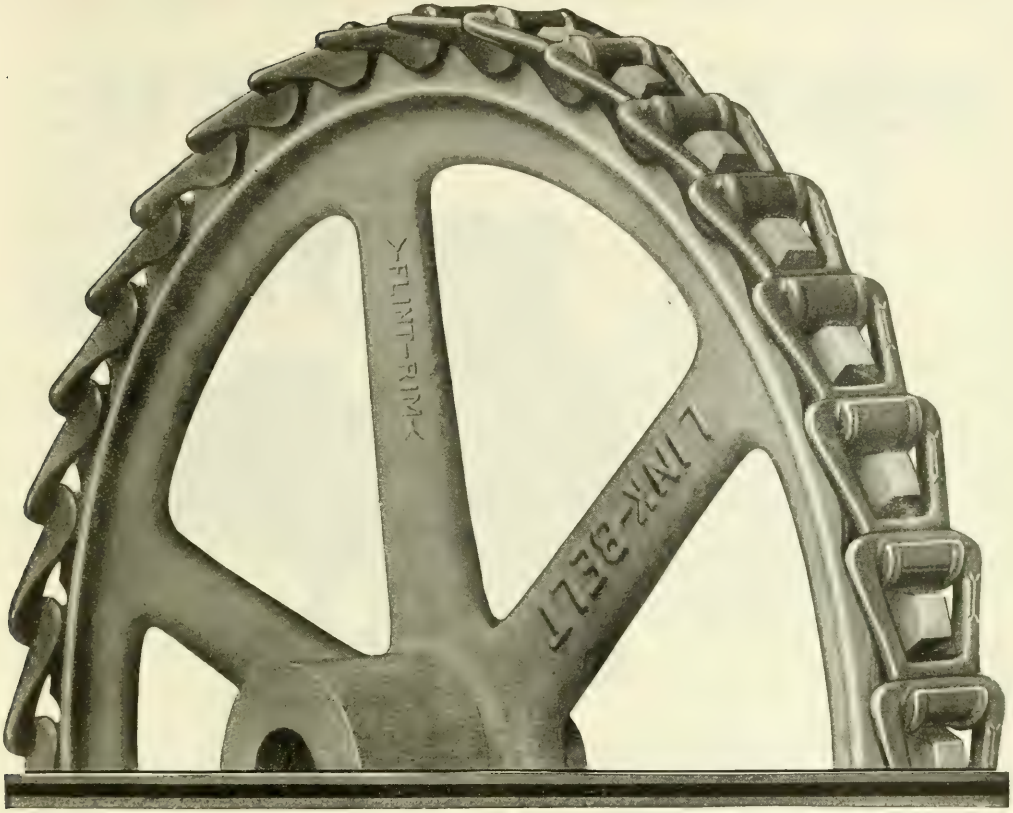
The advice and practical assistance of the Canadian SKF Engineers are entirely at the command of industrial concerns.

Consult us without incurring any obligation.

Canadian SKF Company, Limited

TORONTO - - MONTREAL

SKF



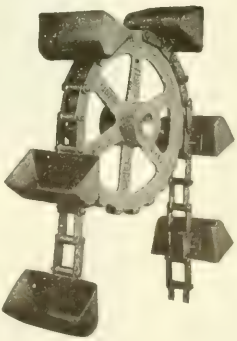
There is no *better* combination than >FLINT-RIM< Wheels and Link-Belt Chains

THEY fit each other snugly. There is no sliding or slipping as the links seat themselves against the teeth. And they continue to fit each other snugly, because the flint hard surfaces prevent wear.

Measure values in length of service, and you will find there is no *cheaper* combination than >FLINT-RIM< wheels and Link-Belt chains.

This trade >——< mark identifies Link-Belt products.

Send for Catalogue and full particulars



CANADIAN LINK-BELT COMPANY, LIMITED

TORONTO: Wellington and Peter Sts. **MONTREAL: 10 St. Michaels Lane**

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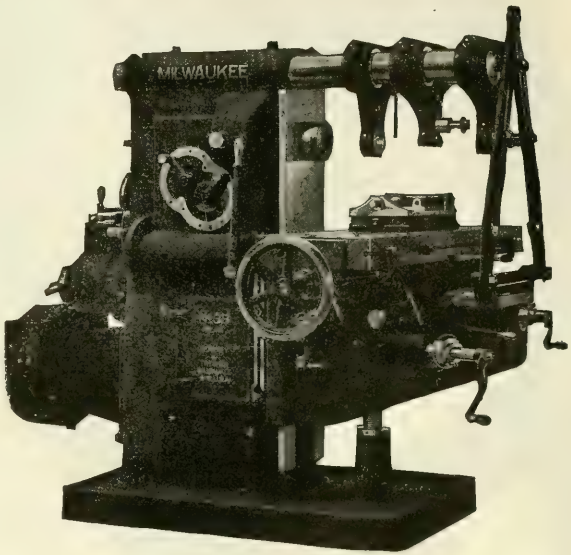
MILWAUKEE MILLING MACHINES

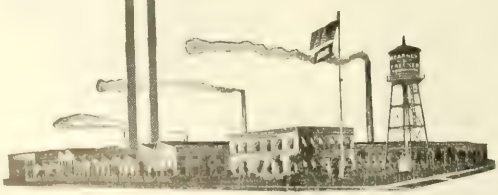


Every Feature An Aid To Milling Economy

TO MEET the varied demands of different classes of work with speed and accuracy, we have incorporated many notable features in Milwaukee Milling Machines which qualify them to accomplish successfully the most exacting requirements. They are designed and constructed to economically perform all classes of milling—light or heavy.

Milwaukee Horizontal Milling Machines possess the double overarm—solid top, box section knee—automatic flooded lubrication system, one and one half gallons of oil per minute flowing over all gears and bearings in the column, feed box and pulley bracket—cutter lubricant pump which functions only when the spindle revolves—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

All these features contribute to "Milwaukee" efficiency and profitable production. Let us send our catalogue.



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Canadian Representatives:

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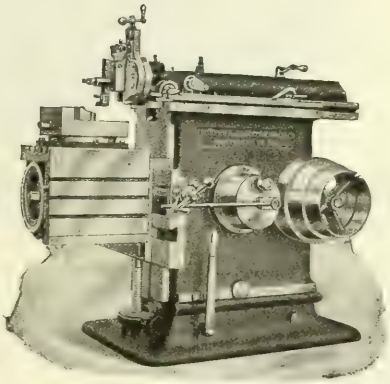
UNIVERSAL

SHAPING MACHINES

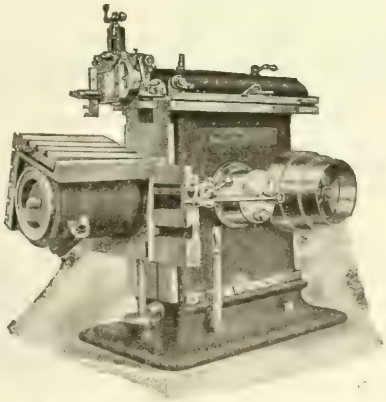


No special vises or fixtures needed; the Universal features of these machines take care of everything, making them particularly adapted to—

Die Work
Tool Making and
General Manufacturing.

Machines regularly furnished with—

Swivelling Graduated Table
Auxiliary Tilting Side for Compound Angles
Power Down Feed on any angle, with any variation of feed
Automatic Feed Stop
Graduated Collars on Tool Head Feed Screw and Table Feed Screw
Swivel Vise and Graduated Base
Table raised and lowered by power on 24-inch size.



We carry large stocks of our 15-inch and 24-inch shapers in our Toronto show rooms—all ready for immediate shipment.

Canadian Offices: **POTTER & JOHNSTON MACHINE CO.**

ROELOFSON MACHINE TOOL CO., LIMITED

Head Office and Show Rooms:

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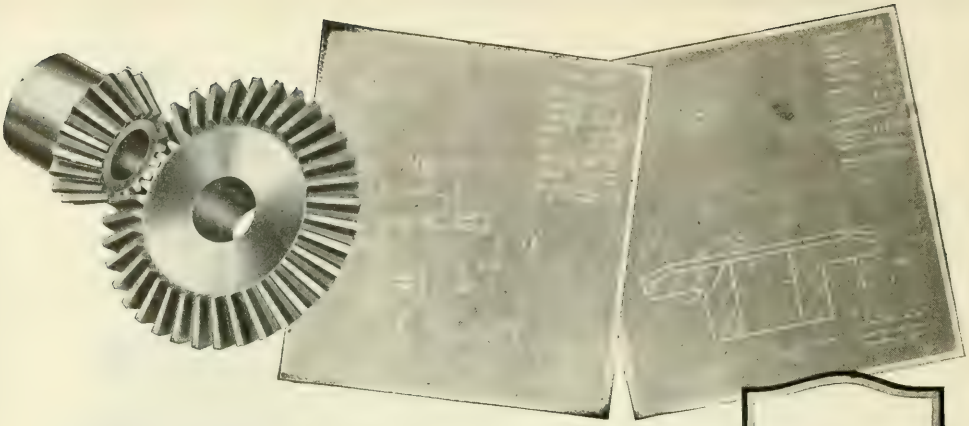


Bevel Gear and Pinion manufactured by the Boston Gear Works, Boston, Mass.

A Job for Master Machinists —and Master Tools

Starrett Tools used for making the beveled gear and pinion pictured above are: Starrett Vernier Calipers, Starrett Improved Universal Bevel Protractor, Starrett Vernier Depth Gage, Starrett Micrometer Depth Gage, and the Starrett Universal Dial Test Indicator.

Have you these tools in *your* kit?

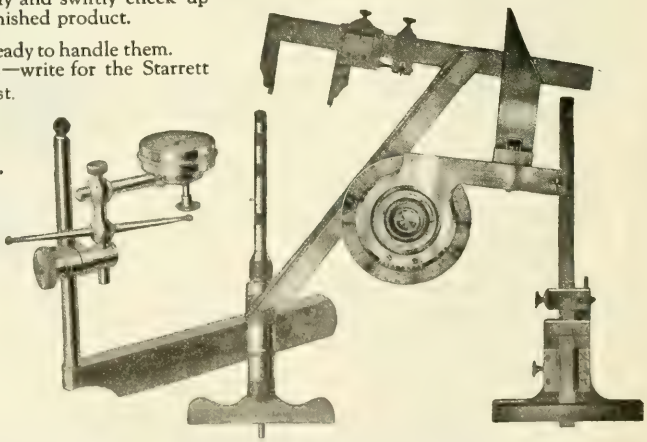
Accurate gear cutting is a job for master machinists—and for master tools. Few machining operations require more accurate or uniform precision.

That is why Starrett Tools are today so largely used in modern gear-cutting establishments. In many such plants Starrett Tools guide the accuracy of every gear-cutting operation, and aid the inspector to exactly and swiftly check up every angle and dimension of the finished product.

Gear-cutting jobs come to *you*. Be ready to handle them. *Complete* your kit of Starrett Tools—write for the Starrett Catalog No. 22, "3." Free on request.

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.

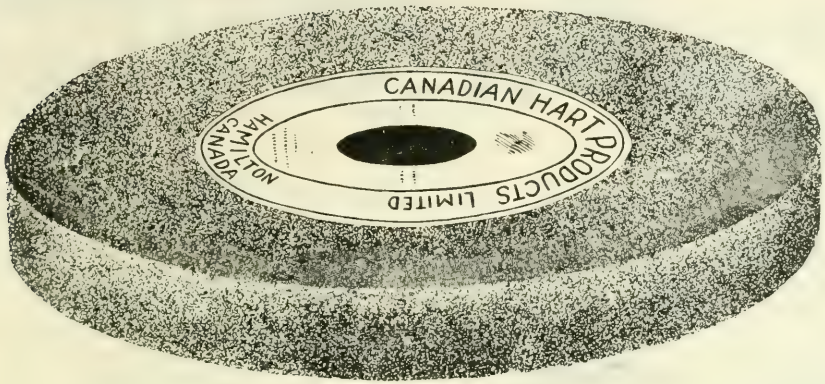


42 178

STARRETT TOOLS

STARRETT HACKSAWS CUT QUICKER LAST LONGER

Use Starrett Tools



We'll Shoulder Your Grinding Troubles!

ARE your grinding operations up to the mark? Is the quantity and quality of work in your shop what it should be? Probably you have tried to improve matters, but in vain. Don't give up. Let us shoulder your difficulties. Acquaint us with the nature of your work and we will undertake to improve your production with every assurance of success. We are doing this for many other shops—we can do it for you.

MADE IN *CANADA*

Canadian Hart Products Limited

Hamilton -- Canada

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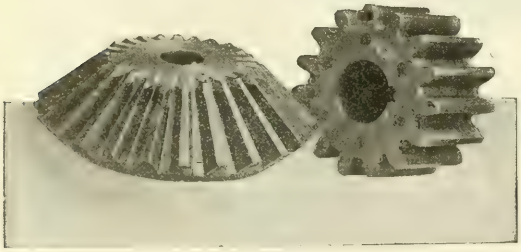
Write for
Data Sheet
No. 32
on
Raw Hide Pinions

CUT GEARS



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QUICK DELIVERIES

High Carbon Steel
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QUALITY GUARANTEED

Sizes—½ lb. to 5,000 lbs. each

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ESTABLISHED 1860

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ATLAS CRUCIBLE STEEL Co.
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Made in Canada

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ATLAS TOOL STEELS
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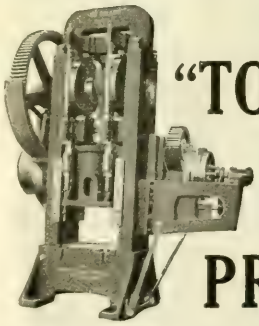


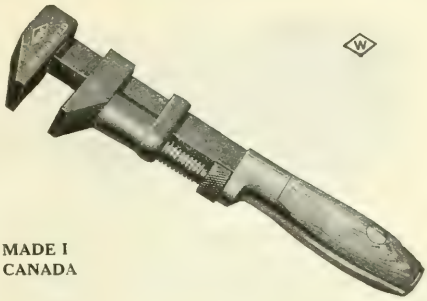
The
"TOLEDO"
Double Action
Cam Drawing
PRESSES

This "Toledo" is particularly adapted for cutting and drawing cups and shells made from comparatively heavy metal, in one operation.

The "Toledo" Presses carry with them assurance of exceptional performance. The excellence of their design, the care and skill used in their construction and the high grade materials of which they are built, is reflected in every operation they perform.

May we send you full particulars of those presses in which you are interested?

The Toledo Machine & Tool Co.
Toledo, Ohio, U.S.A.



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WILLIAMS'
SUPERIOR WRENCHES

"W. & B" Machinists' Knife Handle Wrenches will stand an extraordinary amount of abuse. They are rugged, sturdy tools with clean-cut, accurately formed jaws and hardened working parts. Easy to adjust, well balanced, with ample leverage for difficult work, even when the jaw is opened to maximum capacity.

Seven sizes—6 to 21 inches—made in Canada, and are carried by your dealer. Two other patterns also. Screw Wrench Book on request.

DROP-FORGINGS
often cheaper than castings
—always far superior—

J. H. WILLIAMS & CO.
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"The Wrench People"

Formerly Canadian Division of
The Whitman & Barnes Mfg. Co.

45 Thorold Road, St. Catharines, Ontario

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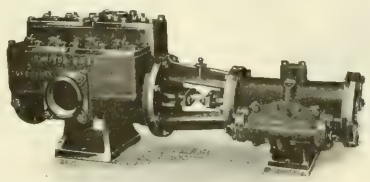

The only Self-Draining Steam Pump Made in Canada

Minimize Pump Troubles!

YOU don't have to put up with troublesome and costly pumps—pumps that leak and are in constant need of adjustment.

Your solution is in the Hepburn Patent Vacuum Pump. It requires very little attention; there are no tappets or levers to give trouble; the valves are very accessible and the long strokes assure a decided steam economy.

Write us for a complete list of features as well as particulars of Hepburn Engines, Compressors, Cranes and other Machine Shop Equipment. Information will be freely given.

JOHN T. HEPBURN LIMITED

Engineers and Iron Founders

18-60 VAN HORNE ST., TORONTO

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TRAHERN

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Coolant Pumps

TRAHERN Coolant Pumps are built as regular equipment into leading Machine Tools. They are easily connected to any machine and will pump any liquid not containing grit.

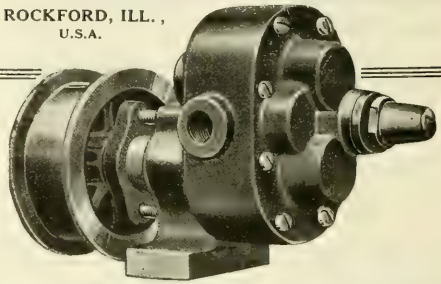
Deliver 16½ G.P.M. at low speed; smooth, forceful stream free from pulsation. Reverse automatically, supply may be shut off at discharge without stopping pump; operate against 100 lbs. pressure if desired. Will not lose prime when properly installed.

Write for our Bulletin 44, giving details.

TRAHERN PUMP DIVISION

Geo. D. Roper Corporation

ROCKFORD, ILL., U.S.A.



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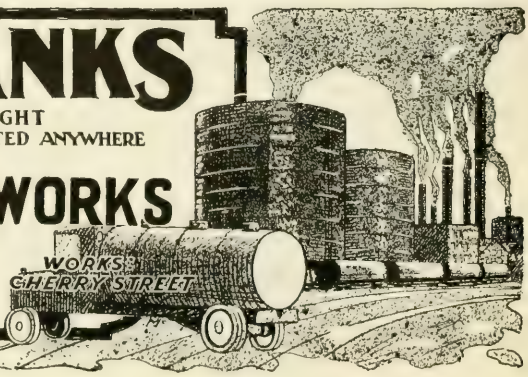

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For Donkey Engines, Saw Carriages, Small Motors, Transmission Line Shafting and all steady heavy pressure duty.

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Tool Steel for Every Purpose

Swedish Lancashire Iron

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JONAS & COLVER, LIMITED
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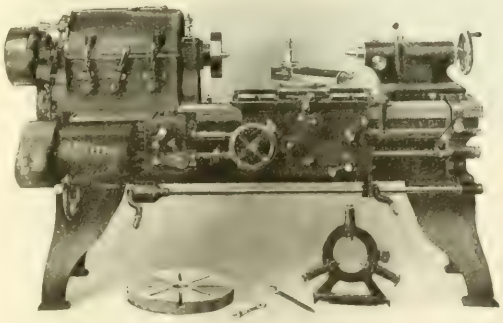
H. BOKER & CO., Inc.
New York, N.Y.

The "Lehmann" Improved Selective Head Lathes

(Patents Pending)

SIZES—14" to 24" SWING

On account of its simplicity of construction, great driving power and rigidity, ample range of speeds, moderate tooth travel of its gears, compact and shapely appearance, the "LEHMANN" Selective Head Engine Lathe stands to-day in a class *ahead* and *alone*. Some of the features of construction are:



Sixteen Spindle Speeds in correct geometrical progression obtained with the use of only ten gears.

Improved Friction Clutches (Patents Pending) running in oil, requiring no adjustment and giving forward and reverse control to spindle.

Heat-treated or Hardened Steel gears.

All Shafts, except spindle, running on ball bearings.

Spindle of alloy steel, hardened and ground at the bearings and running in phosphor bronze boxes.

Head Casting forms oil-tight case enclosing all running parts.

In addition these lathes embody all features such as the patent quick change mechanism, the tailstock spindle locking device, the rod and screw shift, etc., forming part of the "LEHMANN" Cone Head Lathes which have acquired an enviable reputation for accuracy and production.

Let us describe more fully this Exceptional Lathe and its Distinctive Advantages

Lehmann Machine Company - St. Louis, U.S.A.

Chouteau Avenue at Grand

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GRIDLEY

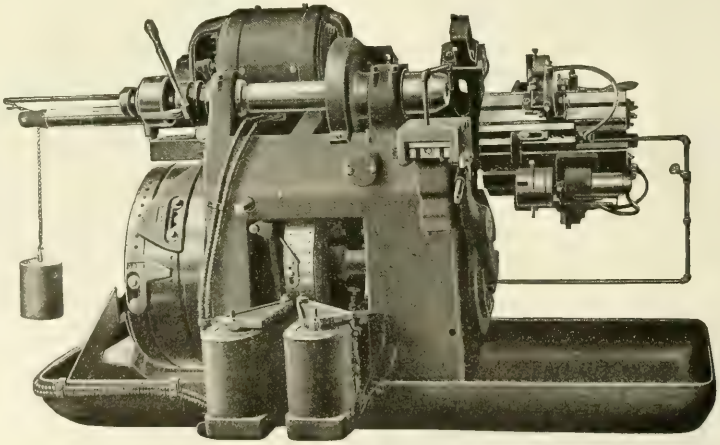
AUTOMATIC TURRET LATHES

The wide range of work possible on Gridley Automatic Turret Lathes and their ease of set-up have made them economical producers of large duplicate parts on both short and long runs.

On all kinds of work their construction for fast feeds and heavy cuts without loss of accuracy has fully satisfied their users.

More of your work should be done automatically.

Capacities up to 5 inches.



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Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps, and Screw Machine Products at Cleveland, Ohio.

HEALD

Cylinder Regrinding Profitable Business

How many Cylinder Grinding Companies in your locality?

We venture to say very few, if any at all. When you know that a very handsome profit results from 3 four-en bloc cylinders a day and that 15 to 20 holes is the usual production, you begin to realize the possibilities of this field.

Without question there are more opportunities in cylinder regrinding and it is the most active of any similar proposition in Canada to-day.

It does not require a large amount of capital nor expensive equipment. Small machine shops, auto repair shops and welding concerns are particularly adapted to this work. They are equipped with lathes, drills, etc., so it only requires one or two additional machines to start in immediately on work, which is just lying around waiting to be picked up.

We know of no one who has gone into this work with a fair amount of energy and business ability who has failed. We can refer you to any number of concerns who have started in on a shoe string and now have a prosperous and successful business.

Having convinced yourself of the possibilities of regrinding, there is but one method and one machine which will handle the work profitably and to best advantage. That is a Heald Style No. 55, built expressly for regrinding work. It is simple, moderately priced, self-contained and has a very large capacity and range, easily taking care of singles, doubles, fours and six en bloc cylinders.

Among the automobile manufacturers of pleasure cars, 84 per cent. grind, and with commercial cars, 91 per cent. In all cases Heald machines are used exclusively.

Let us get with you to-day personally or by mail and give you facts and figures on the profits and possibilities of this business.

The Heald Machine Co.

51 New Bond St., Worcester, Mass.

BRANCHES AT:
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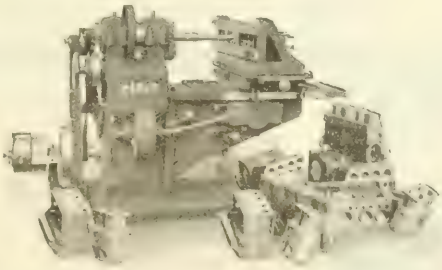
Chicago Cincinnati



All sizes are handled on the Heald Style No. 55

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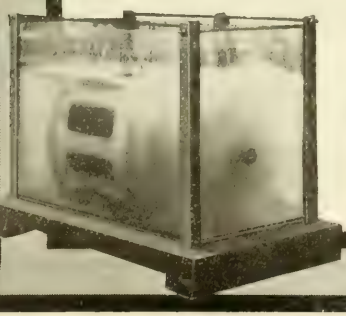

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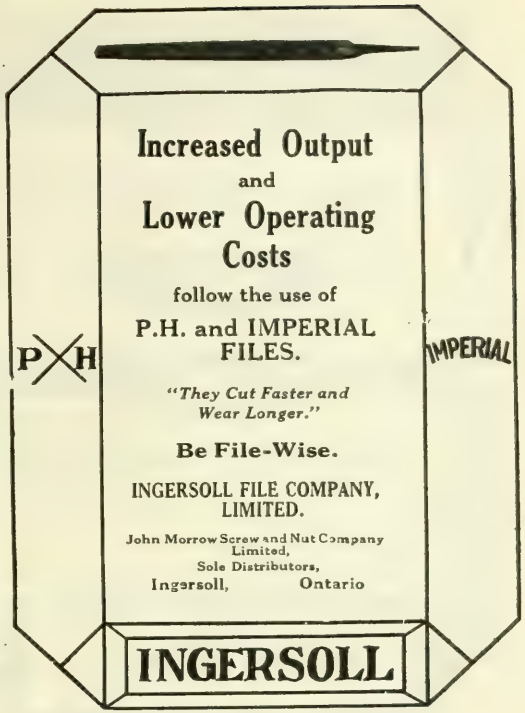

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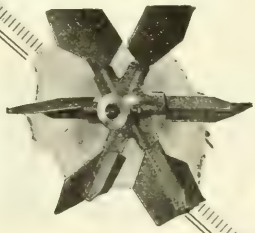

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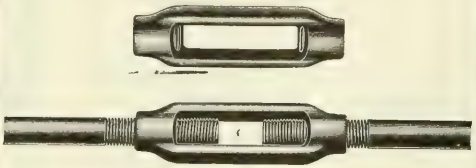

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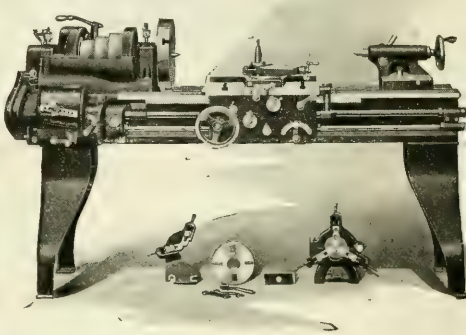

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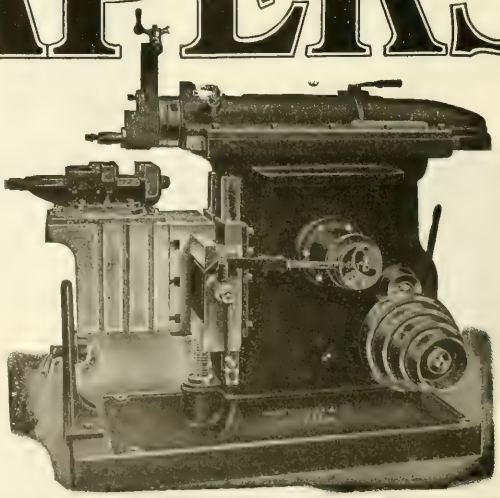

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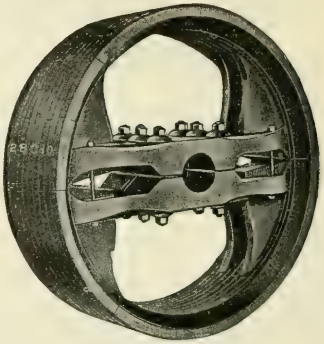

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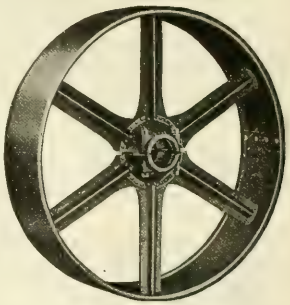

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CANADIAN MACHINERY AND MANUFACTURING NEWS

VOL. XXV. No. 20. May 19, 1921

Gear Shaping Automobile Transmission Gears

Trend in Design of Automobile Transmissions—Variations in Design—Methods of Holding and Generating the Gear Teeth—Cutting Two Reverse Gear Blanks

By DOUGLAS T. HAMILTON*

FROM the cumbersome and complicated automobile transmission of 20 to 25 years ago to the present compact and highly efficient transmission, a constant development in design, methods of cutting and adaptation of high-grade steels has taken place. The first transmission gears were made of cast iron, of coarse pitch, and were keyed to shafts, the latter sliding. These transmissions were necessarily very bulky and inefficient as compared with the present type.

Present-day Automobile Transmission Gears

The present trend in the design of automobile transmissions is to make them compact, and the greater percentage of them are held in a case that is attached to the engine housing. The pitch of the teeth for low-powered cars never exceeds 7/9 pitch stub tooth, whereas for higher-powered cars 6/8 and even 5/7 are sometimes used. In a few cases, a full-length tooth with a 20-degree pressure angle has been adopted, the pitch being 6, but this is the exception rather than the rule.

*Fellows Gear Shaper Co., Springfield, Vt.

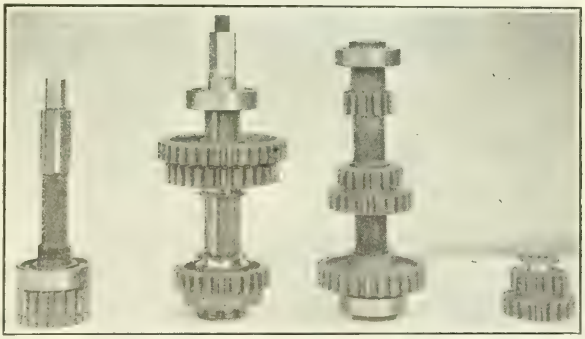


FIG. 3 VARIOUS GEARS USED IN A FOUR-SPEED FORWARD AND TWO REVERSE TYPE OF TRUCK TRANSMISSION.

Another general practice in the making of transmission gears is to make the counter-shaft gear in one solid piece (see Fig. 1), instead of making them up in separate pieces, and attaching them to the shaft by means of keys. The latter method is not only more expensive, but is not as satisfactory.

In order to deal in an intelligent manner with the methods used in the cutting of transmission gears, it is there-

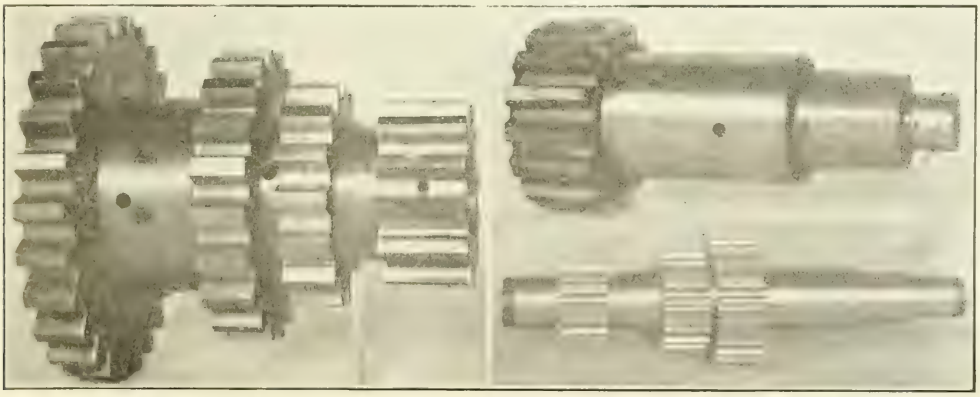


FIG. 1 SHOWING A ONE-PIECE AUTOMOBILE TRANSMISSION COUNTERSHAFT GEAR, ALSO A DIRECT-DRIVE COUNTERSHAFT GEAR OF THE ONE-PIECE TYPE; THE FOURTH GEAR BEING HELD ON THE SHAFT BY A KEY.

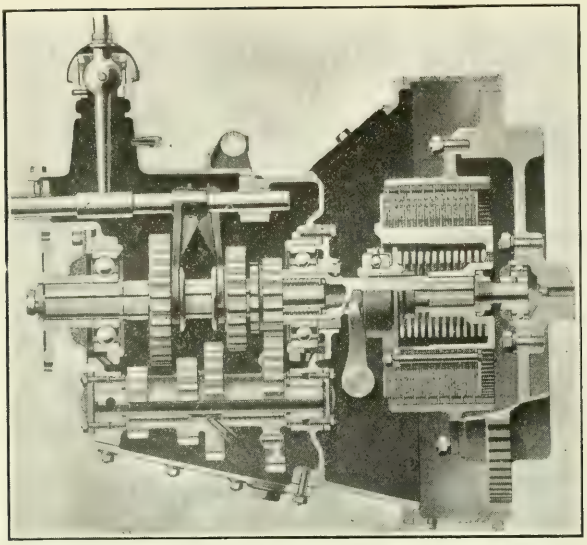


FIG. 2. SECTION THROUGH A PROMINENT AUTOMOBILE TRANSMISSION OF THE THREE-SPEED FORWARD AND REVERSE TYPE USED IN A HIGH-GRADE CAR.

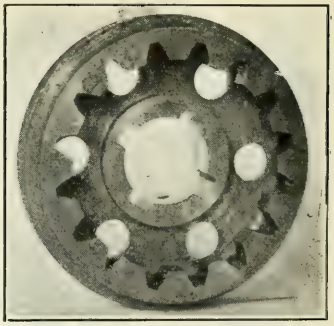


FIG. 4. DIRECT-DRIVE CLUTCH GEAR OF THE INTERNAL GEAR TYPE.

fore necessary first to take into consideration the various forms in which these gears are made. Fig. 2 shows a popular automobile transmission for a high-powered car, and indicates the construction very clearly. It will be noticed that the counter-shaft gear is made in one piece, but that the largest gear on the counter-shaft is held to a flange on this forging by rivets. This construction is sometimes necessary because of the difficulty in making a forging with the large gear on one end. In other cases the counter-shaft is a plain shaft and the various gears are held on it by means of keys. This is not considered good practice. The shape and form of a gear, of course, control the method used in cutting it, and in the following we will show a number of different types of automobile transmission gears and illustrate the method by which they are held when the teeth are being generated.

Fig. 3 shows a form of transmission gear used in a truck where only one gear is forged solid with the counter-shaft, and the other three gears, two of which are made in one piece, are keyed to the counter-shaft. This is a four-forward, and two-reverse speed, and is mounted in the case on ball bearings. The direct-drive pinion shaft is also mounted on ball bearings as indicated and the sliding gear shaft is held in this pinion and mounted on roller bearings.

Fig. 4 shows a combined sliding transmission gear and direct-drive clutch for a light transmission. This gear is held on the splined shaft, and the forward end of the gear is provided with internal teeth which mesh with the teeth in the direct-drive pinion, Fig. 5. Teeth cut in the circumference of the gear in Fig. 4 mesh with the teeth in the largest counter-shaft gear.

Holding and Cutting Direct-drive Pinions

The direct-drive pinion of an automobile transmission, as shown in Fig. 2, in addition to acting as one member of the direct-drive clutch, also drives to the countershaft. The teeth in this pinion are therefore made considerably longer

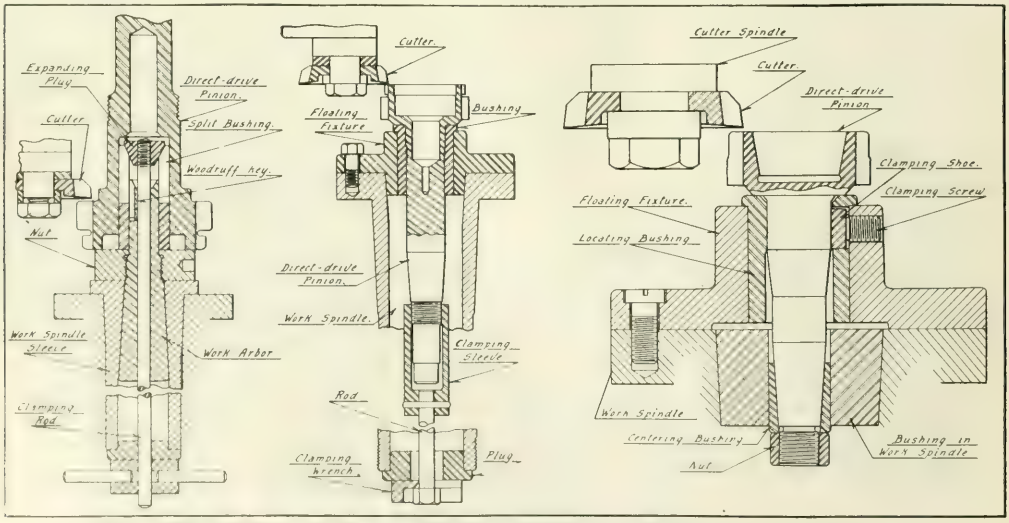


FIG. 7. LEFT HAND VIEW. DIAGRAM ILLUSTRATING OBJECTIONABLE FIXTURE SHOWN IN FIG. 6.
FIG. 8. CENTRE VIEW. COMMENDABLE METHOD OF HOLDING DIRECT-DRIVE PINION WITH INTEGRAL SHAFT.
FIG. 9. RIGHT HAND VIEW. ANOTHER SUGGESTION FOR HOLDING PINION HAVING A SHORTER SHAFT.

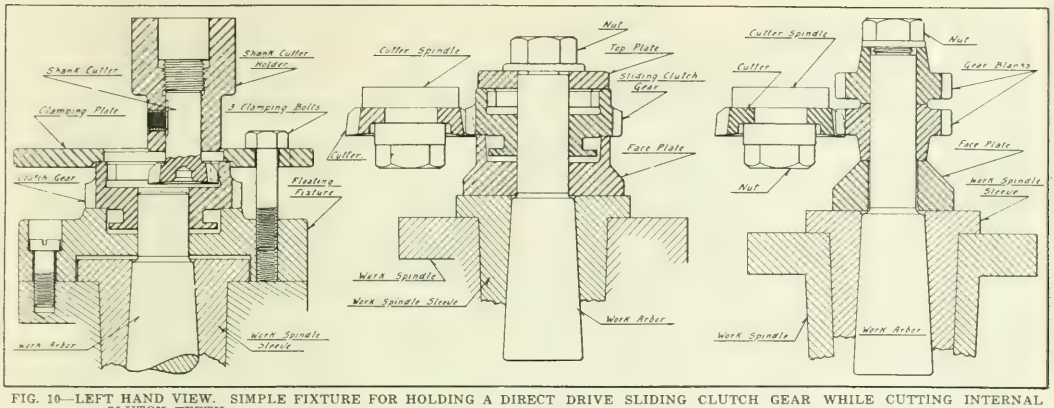


FIG. 10—LEFT HAND VIEW. SIMPLE FIXTURE FOR HOLDING A DIRECT DRIVE SLIDING CLUTCH GEAR WHILE CUTTING INTERNAL CLUTCH TEETH.
FIG. 12—CENTER VIEW. HOLDING A SLIDING CLUTCH GEAR WHILE CUTTING THE EXTERNAL TEETH, ONE GEAR HELD AT A TIME.
FIG. 14—RIGHT HAND VIEW. METHOD OF HOLDING TRANSMISSION REVERSE PINIONS WHEN CUTTING THE TEETH.

than the width of face of the large or first counter-shaft gear, the forward end of the teeth, which are reduced in diameter, being used as the clutching member. Usually, also, the forward end of the teeth are rounded, as well as the tops to facilitate engagement.

The method used in holding this direct-drive pinion when cutting the teeth is governed of course to a large extent by the design and shape of the shaft. As a general rule, however, the gear should be located from the shaft and particularly from that portion where the bearing will be located.

Another method of holding and locating, but which is not recommended, is shown in Fig. 6, and in diagram form in Fig. 7. This method is objectionable for the reason that it is not only difficult to hold a gear concentric with an expanding bushing, but this form of clamping device does not give sufficient rigidity. It will be noticed in Fig. 7 that a special hollow work-arbor is fitted into the spindle, and keyed to this is a long clamping rod. This rod carries a cone plug at its upper end, which when drawn down, expands the split bushing locating and clamping the work. The clamping rod is operated from the lower end of the work-spindle as shown.

The preferable method of holding a direct-drive pinion shaft is shown in Fig. 8. Here it will be noticed the shaft is inserted into the work spindle, being located by a bushing in a floating fixture, the latter being clamped to the nose of the spindle. This fixture is centered directly from the work itself by a dial indicator and is then clamped rigidly in position. The work is clamped in the fixture by a pull rod working from the lower end, and attached to a sleeve that is screwed on the threaded shank of the work. A quick-acting clamping wrench fitting the hexagon-shaped end on the pull-rod is provided. This arrangement, it will be seen, provides both a rigid support for the work, and assures that the teeth are cut concentric with the bearing on the shaft.

Still another type of fixture for holding a direct-drive pinion is shown in Fig. 9. In this case the shank is compara-

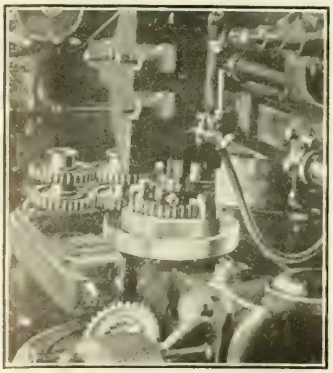


FIG. 11 ANOTHER SIMPLE FIXTURE FOR HOLDING DIRECT-DRIVE SLIDING CLUTCH GEARS WHILE CUTTING INTERNAL TEETH.

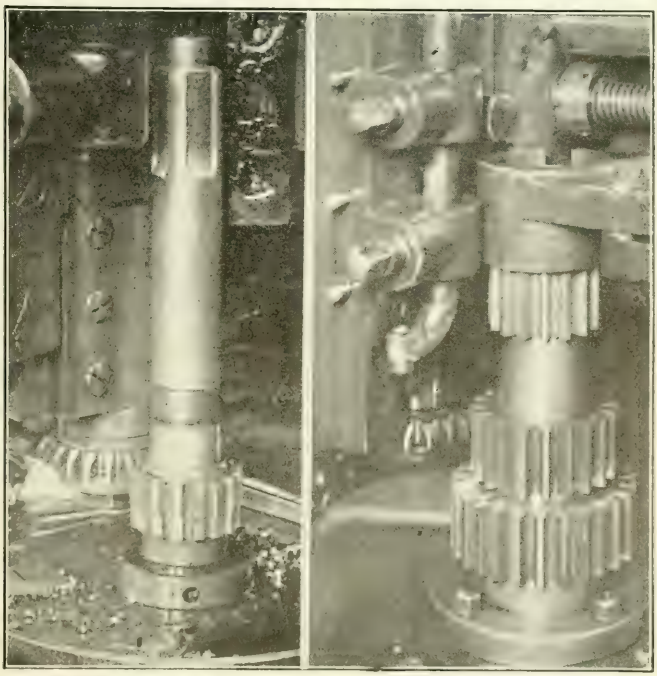


FIG. 6 LEFT HAND VIEW. AN OBJECTIONABLE METHOD OF HOLDING DIRECT-DRIVE CLUTCH PINION WITH AN INTEGRAL SHAFT.
FIG. 16—SHOWING FIXTURE USED FOR HOLDING THE COUNTER-SHAFT GEAR, SHOWN IN GROUP AT FIG. 1.

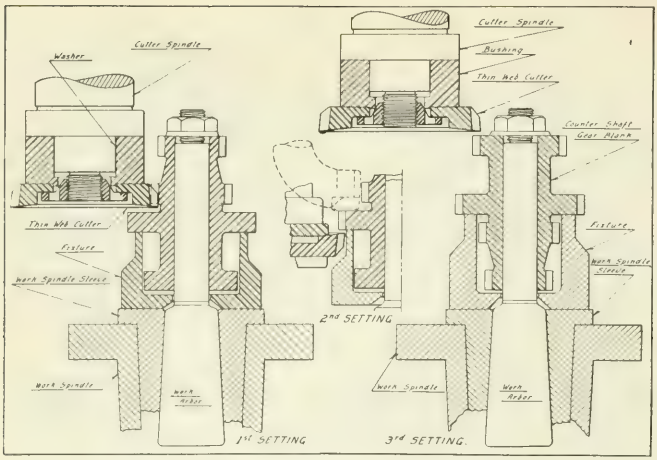


FIG. 17—SHOWING HOW A ONE-PIECE COUNTER-SHAFT GEAR IS HELD AND HOW THE TEETH ARE CUT; THREE SETTINGS ARE REQUIRED.

tively short, so that a different method of holding is recommended. A bushing is fitted in the work-spindle, this retaining a tapered centering bushing, which locates the work at the lower end. It is held in a floating fixture and clamped by a segment shoe at the upper end. This fixture provides a good means of centering and holding the work, and is recommended for holding direct-drive pinions having short shanks.

Holding and Cutting Direct-drive Sliding Clutch Gears

Sliding clutch gears used in automobile transmissions are made in two distinct types—those having internal gear teeth, such as shown in Fig. 4, and those having half-holes. The half-hole type is produced by drilling.

Fig. 10 shows one type of fixture for holding a clutch gear when cutting the internal teeth. A floating type of fixture, which in this case is centered by the work-arbor, is fastened to the top nose of the work-spindle. The work-arbor also centers the work, which is held to the top face of the fixture by a clamping ring. The teeth are cut by means of a shank-type cutter.

Fig. 11 illustrates another simple type of fixture for a slightly different type of gear. In this case also, the work and fixture are located by the work-arbor, but the work is held in place by two clamping straps.

Holding Clutch Gears When Cutting External Teeth

As the hole in the sliding clutch gear is the point from which the gear is located when in use, it should be located from the hole when the teeth are being cut. If the gear has a square hole, which is the case when a square shaft is used, then a square bushing having a cylindrical hole, which fits the work-arbor, should be used. It is poor practice to use a square work-arbor.

Fig. 12 shows a simple fixture for holding a sliding-clutch gear. In this particular case, the teeth, both external and internal, are cut before the splines, and therefore a plain cylindrical arbor is used for locating the work. The face-plate is recessed to receive the grooved collar on the gear, and the gear is clamped in place by a top plate and nut.

Fig. 13 at A shows simple fixture for holding and clamping sliding transmission gears. The gears are made with a hole that is larger than the largest gear shaper arbor, so that bushings are used. Notice that the lower bushing projects into the upper gear—this facilitates proper alignment of the two gears on the arbor. Two gears, as shown, are cast at one time, being reversed and located with their plain faces together. This prevents any gap, and makes possible greater production as the face width is reduced over that which would result if the flanged faces were placed together. The other details of the fixture can be clearly seen from the illustration.

The view B in Fig. 13 shows how two counter-shaft gears of the "built-up" type are held when cutting the teeth. The fixture is almost identical with that at A, with the one difference that owing to the projection of both hubs a spacing washer between the two gears is necessary. With this type of fixture the gear shaper cannot be operated at as high a speed because the cutter has to jump a gap, necessitating a slower cutting speed.

A simple fixture for holding two reverse gear blanks is shown in Fig. 14. Here an arbor and simple face-plate are

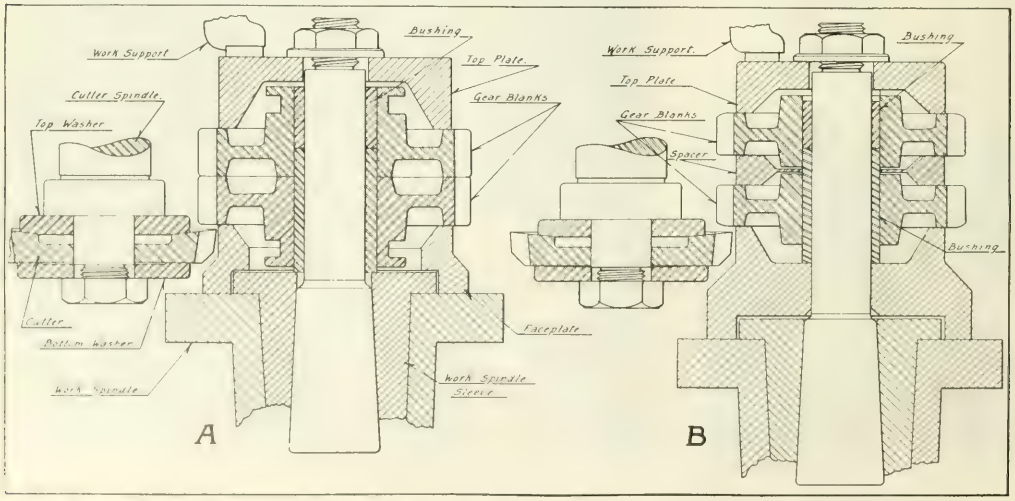


FIG. 13. A SIMPLE FIXTURE FOR HOLDING SLIDING TRANSMISSION GEARS, CUTTING TWO AT A TIME. B. HOLDING INDIVIDUAL COUNTER-SHAFT GEAR, CUTTING TWO AT A TIME. NOTE SPACING WASHER TO TAKE CARE OF TWO PROJECTING HUBS.

used, the blanks being clamped by a nut.

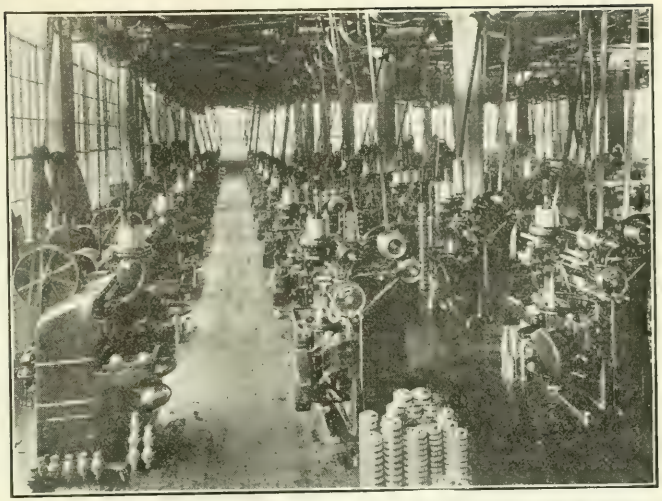
Holding and Cutting Counter-shaft Gears

The method used in holding counter-shaft gears is governed by the design of the gear. For instance, the gear in Fig. 1 would be held on an arbor using face-plates of different heights for cutting the first, fourth, and second and third steps. The counter-shaft gear blank, shown in Fig. 15, however, could not be held in this manner and must be held by the shank. Fig. 16 shows the type of fixture used.

A floating fixture fastened to the top face of the work-spindle carries a centering bushing fitting the shank, the upper end being supported in a bushing held in the special support. Two of the steps are cut with the cutter working on the "push" stroke, whereas the last step is cut with the cutter working on the "pull" stroke. The fourth gear is cut in a separate setting and is keyed to the shaft.

Fig. 17 illustrates one method of holding a counter-shaft gear when made in one piece. In the first setting, the two smaller steps are cut using a cupped fixture, as shown, the cutter working on the "push" stroke. In the second setting the same fixture is used, but the cutter is reversed to operate on the "pull" stroke, and the work-support is used. For the third setting, a higher fixture is necessary, being cupped deeper to clear the gear. The cutter is operated on the "push" stroke.

Many different fixtures could be shown illustrating how different forms of transmission gears should be held, but the foregoing illustrates principles that are capable of wide application.



VIEW OF THE TRANSMISSION DEPARTMENT OF A SPECIALIZED AUTOMOBILE AND TRUCK TRANSMISSION MANUFACTURER IN DETROIT. NOTE THE NUMEROUS GEAR SHAPERS.

MATERIAL HANDLING

The Aims and Organization Committee of the Materials Handling Division of the A.S.M.E. has recently submitted to the Executive Committee of the division a report giving the objects of the division, the scope of its activities and an outline of how the problem is to be approached. Material handling, it is stated, is largely a mechanical-engineering problem divided into two parts: First, the consideration of the detailed design and operation of mechanical equipment for handling material, and, second, the economical and efficient application of this equipment in the arts and industries. The purpose of the Materials Handling Division is to organize, direct and promote these two objects. The report gives the following specific:

Objects of the Division

(a) To co-ordinate and correlate existing data and information, to find the gaps in the knowledge so as to bridge them, and to render the sum total available to the greatest possible number;

(b) To develop the science and economies of material handling in conjunction with and in co-operation with all other logically associated organizations;

(c) To work toward standardization of methods and designs wherever feasible and possible with the belief that such standardization will reduce costs of handling materials;

(d) To promote actively the discussion of material handling in all its economic and engineering phases to the end that it may take its rightful place in future engineering thought and opinion;

(e) To point out the economic wastes of duplication of effort, of manual labor, and of undirected and unplanned material in all its phases;

(f) To aim to correlate the work of all engineers in material handling;

(g) To co-operate with other professional divisions of the society or other associations and organizations;

(h) To initiate and aid research;

(i) To assist in solving national, state and community handling problems; and

(j) To establish an Information Division which would be prepared to furnish such information as a compendium of all devices now on the market, a list of references classified under material handling.

What Is Material Handling?

The scope of the activities of the division is defined as follows: Material handling in this division is concerned only with what may be called the problems of secondary transportation of materials and commodities. It does not concern itself with the broad transportation problems of the common carriers, or the tributaries to common carriers, such as organized highway trucking systems, interurban freight lines and so on. Material handling has to do with the multitudinous operations of "picking up and putting down" materials in process of production, and the handling problems of the linkages between common carriers and delivery to the user.

The objective in any material-handling problem is the reduction of costs. The Professional Division, therefore, will approach the problem in general and will (1) make a survey of the existing industry to ascertain the present state of the art; (2) make studies for the improvement of machinery and equipment for the handling of materials; and (3) ascertain ways and means of reducing costs.

In subdividing the committee activities prime consideration will be given to the two sets of problems in the field of the Materials Handling Division: (1) the technical problems of the industries, and (2) the commercial fields of material-handling machinery. These two main divisions may be subdivided in many different ways, depending on the problem involved. By appointment of committees functioning under the executive committee of the division and co-ordinated with the general committee, a very flexible plan of organization is afforded which may be enlarged or contracted to meet conditions.

To assist in the organization of committees a questionnaire in the form of a classification list is being sent to the members of the division, giving them an opportunity to indicate in what particular features of the material-handling problem they are interested. Only such sub-committees on industry, application and design of equipment as are warranted by the interest and support of the division membership will be formed.

Vertical Gas Engine for Generator Drive

British-Built Gas Engine Developed For Special Purpose—Comparison of Vertical and Horizontal Engines—Turning Effort And Cyclic Irregularity—Details of the Engine

THE extremely high initial cost of all classes of fuel continues to influence that of iron, steel and other industrial products. Furnace coke, both in its manufacture and again when used in the blast furnace, gives off large quantities of gas rich in by-products and valuable as a means of generating power. The efficient utilization of these gases in large gas engines is a problem which has been neglected in the past. It is only now, when faced with the growing scarcity and high market value of our natural fuel resources, that we begin to consider methods for their utilization to the best possible advantage.

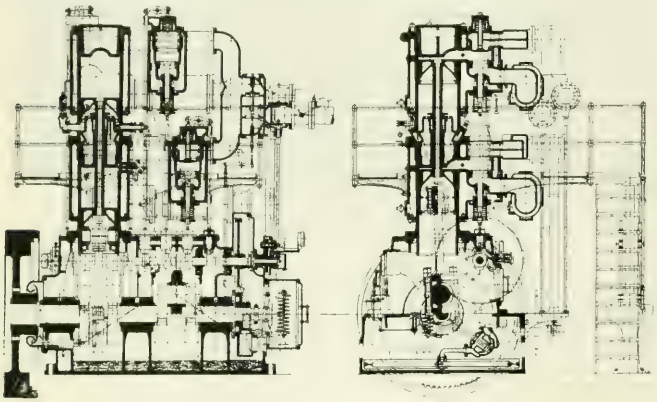


FIG. 1—SECTION OF 300 B.H.P. ENGINE.

During the past ten years marked improvements have been made in gas engine design, with a view to producing a prime mover that will adapt itself to the varying loads required, and at the same time be economical in gas consumption. These improvements are the result of co-operation between some few pioneers of the coal, coke, iron and steel industries, and gas engine manufacturers. The work has been carried out on very practical lines in collieries and ironworks, where there is not a great deal of scope for scientific research, owing to limitations both in the number of staff employed and the expense involved. Valuable data on the subject have been contributed from time to time in papers which have been read before the various societies, etc., from which running costs and general comparative cost figures can be obtained. It is therefore unnecessary to bring these forward here, but rather to explain the development of the existing vertical tandem gas engine.

In the past, when running large gas engines on waste gases, enough importance has not been attached to the maintenance of a constant supply of clean gas at a constant pressure and heat value. These items are dependent to a great extent on the type of ovens, furnaces and cleaning plant employed. To maintain constant pressures the most satisfactory results have been obtained when small gas holders have been employed to control the supply to the engines.

Coke Oven Gas

The greatest difficulty encountered when dealing with coke oven as compared with blast furnace gas has been the fact that the former contains roughly 50 per cent. of free hydrogen by volume and 25 per cent. of marsh gas, whereas the latter only contains from 1 to 2 per cent. of hydrogen and no marsh gas. Their calorific values are:

Coke oven gas 420 to 460 B.t.u. per cubic foot.

Blast furnace gas 90 to 100 B.t.u. per cubic foot.

When using a high value gas in an engine it is usual to reduce the compression pressure and retard the point of ignition, in which case the engine governor independently controls the quantity of air and gas required for a given load, but has no control over the quality of the gas itself. To overcome this difficulty a special device has been developed by the National Gas Engine Co., Ltd., whereby a quantity of cooled exhaust gas is returned to the engine governor. By referring to Fig. 2 it will be seen that the exhaust gas is mixed with the incoming high value gas around the

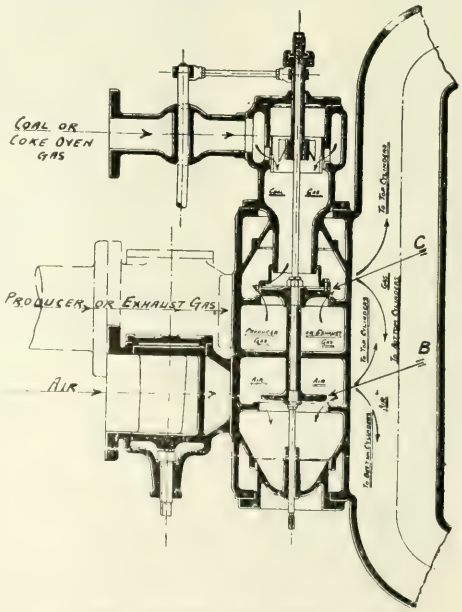


FIG. 2 SPECIAL GAS CONTROL DEVICE.

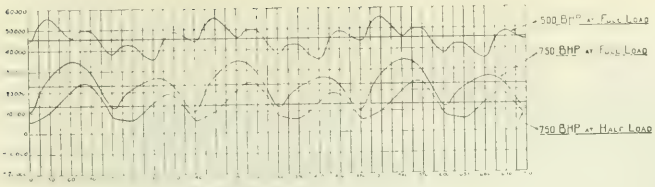
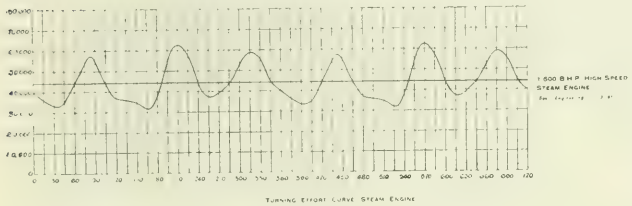


Fig 3.
TURNING EFFORT CURVES GAS ENGINE



TURNING EFFORT CURVE STEAM ENGINE

Fig 4.

throttle valve seat C, independently from the air, which is controlled by the throttle valve B. The heat value of the resultant mixture (i.e., gas proper and exhaust gas) is then say 130 B.t.u. per cubic foot. This reduction in value from 460 to 130 B.t.u. per cubic foot allows the engine compression and ignition timing to be that required for a gas of low heat value such as producer gas.

This type of governor is now adapted to all National vertical tandem engines which are running on high value gases. Since the compression pressure is the same as that required for producer gas, the arrangement can be used as a change-over gear from town's to producer gas, or vice versa, and the change-over can be made when the engine is on full load without any indication of the change on the tachometer or switchboard, when driving an electrical generator. The application of this type of governor shows marked improvement over the standard type of throttle governor using high value gases, both in economy and in the satisfactory running of the engines on varying loads.

Blast Furnace Gas

The use of blast furnace gas for the production of electricity is slowly but gradually becoming adopted. This to a great extent is due to the improvements in design of cleaning plants. The Halberg Beth Dry Filter Plant, although expensive in first cost, will reduce the dust contents of the gas to about 0.001 gramme per cubic metre, which means that the gas is frequently cleaner than the surrounding atmosphere, while large quantities of potash are recovered as a by-product. Wet cleaning plants appear to be giving satisfaction, too, though they do not lend themselves to potash recovery. Electro-static cleaning plants have been in use in England for some time, though for rough cleaning purposes only. A great deal is expected of this method in the near future. It must not be forgotten that the gas must have the existing sensible heat considerably reduced before it can be used in an engine.

Comparison of Vertical and Horizontal Engines

Before proceeding to a description of a vertical tandem engine, it may be of interest to give some of the reasons for adopting this design in preference to the large horizontal type of the same power. One of the chief reasons is the absence of water-cooled moving parts in the vertical tandem machine.

Water-Cooled Moving Parts.—Gas engine pistons, piston rods and exhaust valves for cylinders above a diameter of approximately 25 inches require to be water-cooled. Quite apart from the difficulties in design which exist when allowing for vapor pockets, proper distribution and circulation of the water, complications arise as a direct result of water-cooling, such as the following:

The small amount of space available necessitates the water being of a suitable nature, i.e., it must not contain acid or alkali within certain limits, and efficient arrangements for cleaning must exist in order that the dirt and scale accumulating in the jacket spaces may be removed with comparative ease and in a reasonably short time; the temperature of the cooling water employed must be such that condensation is avoided on the rods and pistons before starting and after stopping; the difficulty of making satisfactory water-tight joints to prevent the leakage of water on to lubricated surfaces, which very often causes serious trouble; and the connection between the internal distributing pipe, to ensure circulation, and the piston rod, is subjected to great stresses on account of the existing forces of inertia.

Weight of Reciprocating Parts.—On large four-cycle double-acting horizontal engines (two cylinder in tandem type) the pistons should not be supported by the surface of the liners, nor the piston rods by the stuffing boxes. To avoid this in practice the rods are turned with their centre lines curved, to compensate for the weight of the pistons. All this weight then falls on the slipper guides. The time required to make adjustments to the working parts of a large horizontal engine is very considerable, due to the fact that these parts are of necessity heavy, and are difficult to handle even with the use of a crane.

Spare Parts.—The cost of spare parts is greater for the horizontal engine than for a multi-cylinder vertical engine, since the latter are standardized and produced in quantity, besides being smaller and more easily handled.

Electrical Generators.—The cost of electrical generators is also greater for the former owing to the difference in engine speeds, the one being run at 80 to 90 r.p.m., while the vertical engines run at between 200 and 300 r.p.m.

Turning Effort and Cyclic Irregularity

Parallel Operation of Alternators.—All alternators have a natural periodicity, depending upon the electrical design of the machine and the load to which it is subjected, and it is essential that deviation from perfect rotation should not exceed 2½ to 3 electrical degrees. It will be easily realized therefore that for an alternator with a large number of poles the permissible fluctuation is much more limited for a slow speed than for a high speed machine. The torque diagram of a steam or gas engine can always be represented as a series of waves irregularly formed, but nearly

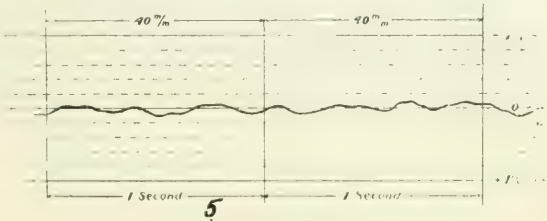


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FIG TACHOGRAPH CURVE.

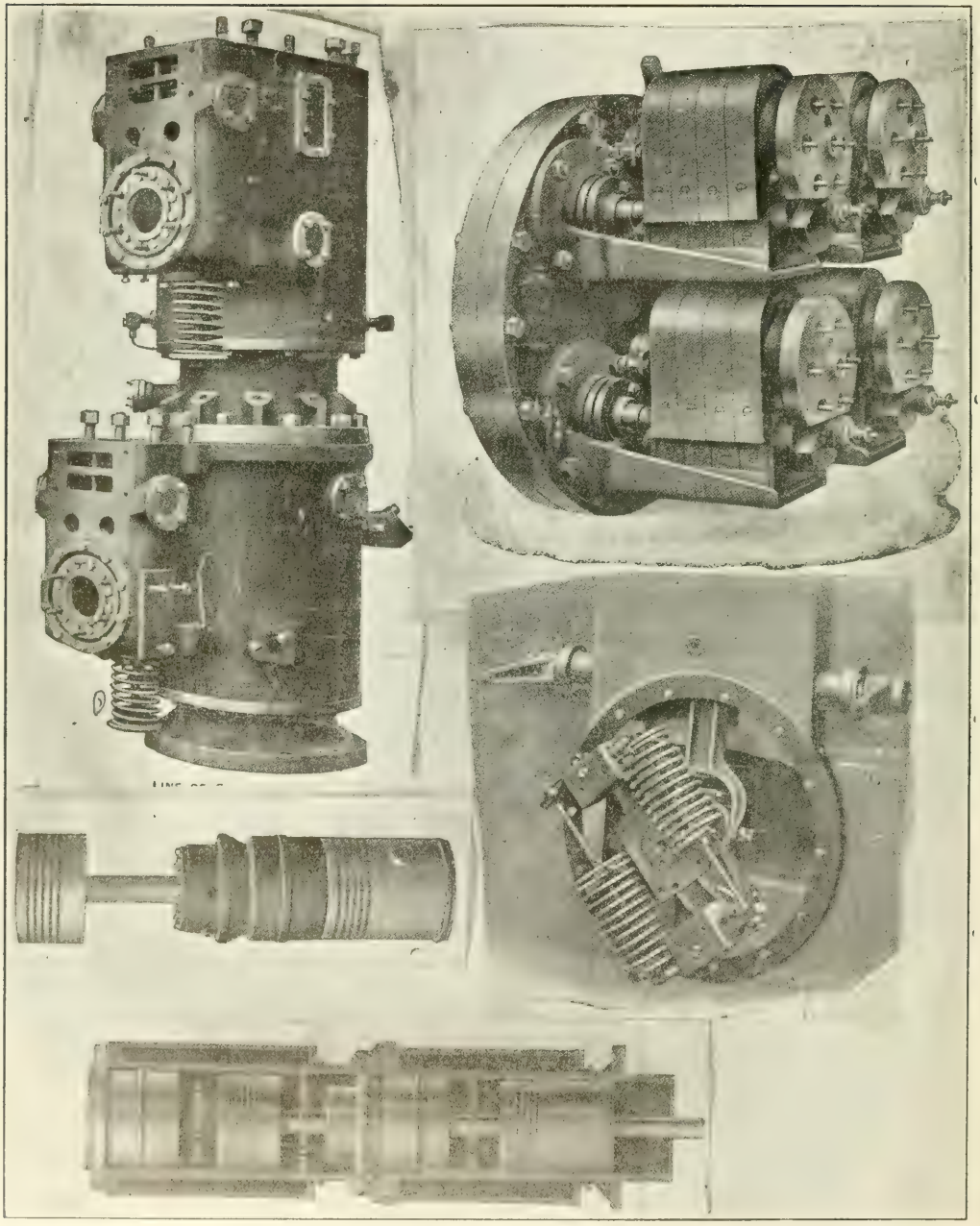


FIG. 6 - CYLINDERS IN TANDEM FIG. 7 - SECTION OF CYLINDERS. FIG. 8 - TOP AND BOTTOM PISTONS. FIG. 10 - GOVERNOR. FIG. 11 - IGNITION.

regularly repeated at constant intervals. (See Figs. 3 and 4.)

The impulses per revolution are, of course, the main factors that determine the flywheel effect if the flywheel is laid out for any standard cyclic irregularity.

If we consider the time of one or two revolutions as a fundamental period it is found that in all well-balanced reciprocating engines harmonics exist depending for their order upon the number of cranks of the engine. The value of the harmonics, although they exist, can be almost entirely ignored as far as hunting is concerned. The important fact is that, unless special precautions are taken, a fundamental wave will exist.

The National vertical tandem engines are designed, when required for alternator work, to have a cyclic irregularity of 1/250. Sufficient flywheel effect is allowed for in their design to easily cover this, and at the same time be

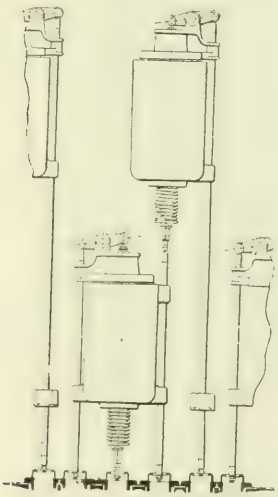


FIG. 9—ARRANGEMENT OF VALVES.

within the limits of 2½ electrical degrees from a standard flywheel. This is very much easier to do with a high speed than with a low speed alternator. Fig. 5 represents a tachograph curve from a vertical tandem engine, from which it will be seen that the cyclic irregularity, taken over the extreme points on the curve, is approximately 1/500.

The "National" Vertical Tandem Gas Engine

For the purpose of description and illustration a sectional arrangement of a 300 B.h.p., 2-crank, 4-cylinder engine is given in Fig. 1. The larger units, except in detail, are similar to this in design. The engines are ouilt in standard sizes from 300 to 2,000 B.h.p., with 2, 3, 4, 6 or 8 cranks. They operate on the "Otto" four-cycle principle, and each pair of cylinders is arranged in tandem over one crank. (See Fig. 6.)

Cylinders.—A difference in diameter is made between the bore of the top and bottom cylinders, sufficient to allow of a cone seat being made in the top of the lower cylinder. The intermediate head or cover for the bottom cylinder makes a joint on this and is secured by "pole-screws" passing through the flange of the top cylinder on to an angular face around the intermediate head. (See Fig. 7.) A similar joint is made by the top cylinder cover.

Pistons. (See Fig. 8.)—The pistons, both "top" and "bottom," are secured together by means of a bolt of chrome nickel steel passing through a hard cast iron piston rod sleeve. This sleeve acts as a distance piece transmitting the thrust of the top piston to the lower piston, the steel bolt taking the tensile stresses. After being assembled the necessary working clearance is given to the line of pistons in the grinding machine.

Operation.—The tandem arrangement of pistons with an explosion on the top of the upper and lower pistons alternately, together with the number of cranks, gives an even turning effort. Smoothness of running is also the result of cushioning on every "up-stroke," by the compressions of the mixture taking place alternately in the top and bottom cylinders, and on every "down-stroke" in the spaces between the top pistons and intermediate heads. Metallic packing for the piston rods is secured in the top of each intermediate head. The packing is surrounded by the water jacket of the head and is supplied with lubricating oil under pressure.

A line of pistons, consisting of top and bottom pistons secured together, intermediate head and connecting rod, can be withdrawn for inspection and cleaning after removing the top cover, securing nuts and pole screws, water connections and crank head nuts. The whole is withdrawn through the top cylinder by securing a clip to the top piston.

Operation of Valves.—The inlet valves, in their respective cages, are secured in positions directly above the exhaust valves, and in order to give ease of access the valves in the top cylinders are "staggered" in relation to those in the bottom cylinders. (See Fig. 9.) This arrangement allows of a direct lift from above, thus facilitating their removal for inspection. The valves are operated by push rods and rocking levers, the exhaust valves being arranged vertically over their respective cams.

Governor.—The engine is controlled by a centrifugal governor mounted on the crankshaft (see Fig. 10), which controls the quantity of mixture admitted to the cylinders. Mixture of "gas" and "air" does not take place until the inlet valves open in the cylinders, the two being governed independently, and entirely separated from one another by a division in the manifold induction pipe.

Lubrication.—Lubricating oil is drawn from strainers in the bedplates, each lying in its own trough, into which the oil flows as it drains back from the crank pits. By this means the bulk of dirty oil is isolated from the strainers. The strainers can be withdrawn one at a time without interfering with the running of the engine. A valveless double acting pump delivers the oil at a pressure, which can be regulated, to the oil cooler and engine bearings. The oil supply to the crank head bearings passes through holes drilled in the crankshaft to the crank pin and up through the centre of the connecting rod to the piston pin. For a large installation of more than one unit, or a single unit of 1,000 k.w. and above, the pump, strainers and coolers are separated from the engine and become an auxiliary motor driven unit along with the water circulating pumps. Sight feed lubricators supply clean oil to the top cylinders and piston rod packings.

Ignition.—The electric ignition is in duplicate. Low tension magnetos with high tension coils, connected to each, supply the necessary current. The left-hand magnetos supply the left-hand ignition plugs in each cylinder respectively, and change-over switches on the coils allow of battery ignition being used as a standby.

Starting Gear.—Compressed air is used in the bottom cylinders only for starting the engine, suitable timing, stop and check valves being employed for this purpose, so that no hand movement of cams is necessary when starting the engine.

FORCING HOME A PISTON HEAD

A nut that came off inside the cylinder brought us the job of making a new rod and piston. We made a splendid fit of these but we had no good way of getting the head clear up to the shoulder on the rod. There was no press within fifty miles and we knew that we would injure something if we used the 24-lb. sledge as a "persuader."

Finally we jarred the head on. It was already within an inch of the shoulder and we turned the assembly, head in the air, resting the cross head end of the rod on a piece of 3″ x 12″ maple plank. A length of rope to the roof truss prevented it from toppling and acted as a safety. A foot of 4″ pipe secured to the plank guided the lower end. Then four good men lifted the job about 6″ at a time and let it drop, soon getting the desired position with this 200-lb. head.

WHAT OUR READERS THINK AND DO

TURNING CROSS-HEAD PINS.

By. F. C. H.

In reference to article on "Turning of Cross-head Pins" in April 7th issue of Canadian Machinery, I'd like to air a few thoughts on the subject.

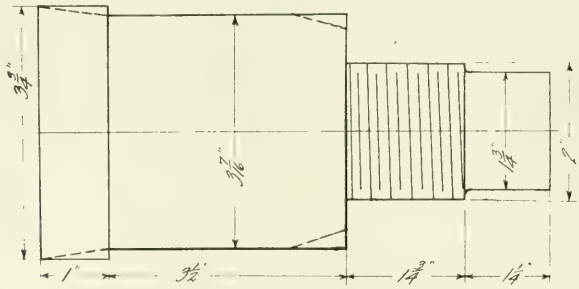
I will not attempt to say that the salesman was wrong, or that the pin *cannot* be completed in twenty minutes, for we see things happening every day that were thought impossible a short time ago, but, like the foreman in the story, I want to see it done.

In the plant where I hang up my coat, we do a great amount of engine repair work, and the size of the cross-head pins is always changing. This makes it necessary at each shopping to ream the pin to fit in cross-head, due to the stretching of the holes. It also means that we must take the size of each individual cross-head. We semi-finish the pins on a turret lathe, then place these pins in the store room. Whenever a repair is being effected, we get a pin from the stock room and finish it to the cross-head and main rod between centers on the engine lathe. The time on turret lathe to finish out portion of pin, rough cross-head, and main rod fits, center for lathe at one end, and part off from bar for such a pin as shown in your recent article averages thirty minutes for all pieces after the first one.

The turret on which we do this work can be equipped with another tool box on the cross slide, and I do not see why, with the use of a special forming tool, it should take any longer than say fifteen minutes more to complete a pin, such as you showed, on the turret lathe, making a total time of forty-five minutes when working on new pins, such as your article described.

It may be all right for a salesman to say that a machine can perform the work in a certain time, and perhaps it could under the most favorable conditions, but how often do we get such conditions? The side rod knuckle pin shown in the sketch accompanying this article is similar to the cross-head pin previously mentioned, and so also semi-finished on the turret lathe, taking an average of twenty-three minutes each. The pin is later finished on an engine lathe to the rod it is intended for.

Editor's note.—This subject should be of considerable interest. We would like to hear from machine manufacturers themselves regarding what they consider a fair time to complete both the pin shown in this article and the one illustrated in April 7th issue.



LET US HEAR FROM YOU REGARDING BOTH QUERIES.

WHY BELTS ARE STIFF

By RALPH BENTZ

An excellent way in which to make a study of belt fibre action is to take a pad of scratch paper, a magazine, or something of that sort, and bend it. It is easy to bend a pad of paper when the motion of the ends of the paper is unrestricted. You will note that one sheet slips along on the other a short distance. There is no tension on the convex side, or compression on the concave side of the bent pad. Glue the ends together, or hold the ends tightly with the hands, however, and it will be found more difficult to bend the pad. There will be a "buckling" on the concave side. The convex side will be in tension.

Next glue the complete pad together by saturating it in glue and drying, and you will have a chunk of material that will be as difficult to bend as cardboard, or even as difficult as wood. This is because buckling becomes impossible on the concave side if the gluing job is properly done, and there is no sliding. There is a certain plane close to, or at the centre, that is neither stretched nor compressed when the "board" is bent. That plane is called the "neutral axis." On the concave side of that axis the fibres of the board are in compression. On the convex side the fibres in tension.

The thicker the board the greater the force required to bend it. This is true because the fibres farthest away from the neutral axis have a longer lever arm than in a thinner board. And that is why steel I-beams, channels, Z-bars, etc., are made for engineering structures—to put the outside steel fibres as far away as practicable from the neutral axis.

This explains why belts may be stiff or pliable. The dry, hard leather belt that is not lubricated in its fibres is naturally stiff because the fibres have difficulty in rubbing one over the other. Thus you will find it more difficult to bend a pad of sand paper or emery paper, for example, than a pad of smooth writing paper. The dry, hard belt does not permit its fibres to slide on one another so easily on the tensile side nor on the compression side. The treated lubricated belt on the other hand, permits its fibres to slide with greater freedom. There is no "grinding" as in a pad of sand paper.

This method of studying the belt will clear away many of the points that have possibly been troubling many belt users. It explains why double or three-ply belts are stiffer than single belts. It explains why treated belts are more pliable than untreated belts of the same thickness. It shows why lapped cement joints have a tendency to loosen or "shear" and why the cement used in any belt must be good. Pick up a pad or magazine one-fourth of an inch thick and try it.

AUTHOR, ATTENTION?

Some time ago we received an article on forming in the lathe. The reading matter for this article has disappeared. Will the author kindly write us relative to this, enclosing once more the reading copy?

Turning Old Oil Into New

Frederic A. Talbot

THE extraordinary demand for oil during the war brought prominently forward the question of recovering it from waste materials at small expense. Chambers's Journal tells of such a method recently discovered by which this can be effected without recourse to any chemical process.

"The process in question," says the writer, "compels attention because it completely dispenses with any necessity to resort to chemical processes, which at one time were considered the only feasible solution of the problem.

"The system may be most aptly described as the effective application of dry heat combined with centrifugal force. The necessary plant comprises a cylinder or drum, inside which is placed a perforated steel cage, which in turn receives a basket contrived from wire or perforated sheet-steel. This basket is removable, to facilitate charging and emptying. The cage in which it is placed is so mounted as to be free to revolve, the necessary rotary motion being imparted by a jet of steam playing upon the blades of a small turbine directly connected to the cage.

"The waste—oil-soaked cotton rags, cotton-waste, mechanics' gloves, or whatever it may be—is dumped into the basket, and the latter is then inserted in the cage. The drum is now closed and the steam turned on. The jet of steam playing upon the turbine-blades causes the latter to revolve, carrying the cage and its contents round with it, speed being increased until a peripheral velocity of approximately six thousand to seven thousand feet a minute is reached.

"After the steam has performed its initial function of driving the turbine, it is not permitted to escape, but rises through a central dome to pass into the heart of the contents of the cage within. It permeates the whole of the material, thus heating it up, and in so doing renders the oil more fluid. Passing through the material, the steam escapes through the perforations in the cage, and thence into the outer air. The oil and the grease thus liquified become separated from the solid material as represented by the rag or waste, and upon release, under the centrifugal action set up, are forced through the meshes of the basket and the perforations of the cage, to fall within the annular space between the cage and the outer drum. The oily ingredients, being of the same temperature as the steam, are rendered exceedingly fluid, with the result that they run readily. The oil, falling to the bottom of the drum beyond the zone of centrifugal action, is now permitted to escape from the separator into the settling-tanks. Here any solid impurities which may be present gravitate to the bottom in a sediment as the oil cools, to be subsequently drawn off. If desired, filtering of the oil may be carried out simultaneously, the hot oil being conducted from the separator to vessels provided for this purpose.

"It will be seen that the process is continuous, it only being necessary to stop the machine at times to withdraw the basket and empty the contents, from which nearly all the oil has been extracted, and to insert a fresh charge. The fact that the whole of the retrievable oil has been extracted from the contents of the basket is apparent from the cessation of the flow from the drain-pipe into the settling or purification tank. The actual time occupied in the separating process naturally varies according to the heaviness and the character of the oil or grease.

"The apparatus itself is noticeable from its compactness, simplicity of operation, the small space required to accommodate it, and its high efficiency.

"The material from which the oil has been extracted, upon removal from the basket, is submitted to a washing process which extracts all dirt and other foreign matter. Upon emergence from the washer the material is placed in a drying-cabinet. When withdrawn from the cabinet it is ready for use once more, being as clean as when first served out to the workmen."

Efficient Routing System

A RECENT article on the "Routing of 1,600 parts through a typewriter plant," tells of some splendid methods adopted. Here are a few portions, taken from the material, which appeared in a recent issue of "The Iron Trade Review."

The typewriter in question has 1,600 parts, and as the production at the plant at present is nearly 400 complete machines a day, this means that over half a million parts must pass through the assembling department during the eight working hours.

To co-ordinate the work of the different pieces and different machines it was found necessary to have reliable information as to the production time of each part entering into the complete typewriter. Accordingly, production charts were made, and when the average time required for the manufacture of each part was determined, a master chart or curve was prepared. Briefly, this curve represents the theoretical time at which operation on each part should be started in order to have all parts completed on the same day.

If operations on one particular part are not started at the date shown on the curve, they will not under normal conditions be finished in time to enter into the completed machine. The machines are grouped under definite orders and all of the parts for one particular order are carefully started in accordance with the chart. The chart is also used in determining the length of time that a particular machine tool will be used on a definite operation and from this the work is distributed to the various machines so as to keep the operating time of all as nearly uniform as possible. This minimizes idleness.

An interesting method of storing rods is employed. The rods are placed in racks which are nearly vertical, the rods tipping back approximately 15 degrees to hold them in place. There are two principal advantages to this method of storing. One is the greater ease in obtaining rods, and the other is that the vertical position gives the oil on the rods a better chance to run off and so leaves them in a cleaner condition. The rods rest on sawdust at the bottom of the bins and the large quantities of oil accumulating in this sawdust furnish concrete evidence of the cleaner condition of the rods themselves.

A Suggestion Idea

THE suggestion committee of the General Electric Co. hold an open meeting at the end of each year, and all those who submitted suggestions throughout the year are invited. An informal supper is followed by a musical and speaking program, the latter being on the value of suggestions in general. It is found that such meetings keep the interest at high heat.

The Relining of a 24 Inch Centrifugal Pump Shell

Use to Which Pump Was Subjected—Extent of Damage—Former Method of Repair—Latest Method of Building Up and Relining—Type of Equipment Used and Saving Effected

By J. H. MOORE

IN the May 5th issue of Canadian Machinery, we illustrated some examples of electric welding, including the welding of fresh water tanks. The present article still deals with electric welding and tells of an interesting repair job that is at present being performed by the Thompson Welding Co., Ltd., Toronto, Canada.

The work is that of building up the shell of a 24-inch centrifugal pump, which has been used for sucking up the sand from the Toronto bay. The two halves of this shell are shown in the photograph accompanying the article. Needless to state the sand, grit, and pebbles have worked havoc with the pump shell, which is a steel casting; until at the present time the interior is a mass of holes, grooves, and cavities. Before the pump is fit for use, these have to be filled up, and when we state that some of the grooves are 22 inches long, about 1 inch to 3 inches wide, and ranging from ½ inch to 2½ inches deep, readers can form some idea of the task ahead. Not only are they filling up the holes, but they are building up a ⅜-inch thick lining all around the inside of the shell.

So far, 600 pounds of metal has been used in the building up process, and at least another 150 pounds will be necessary before the work is completed. The small view to the right of the general photograph, depicts the operator busy at work. Some of the cavities can be noticed to the left of the workman, although the photograph cannot attempt to do justice to the number nor size of these grooves.

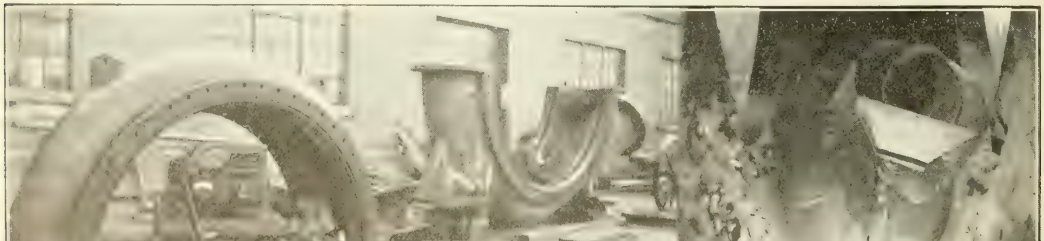
A Lincoln D.C. 150 ampere machine, mounted on a truck as shown in photograph is being used, and a total time of five weeks is expected to complete the work.

Previous to this particular job, the same company repaired a similar pump last year, although in that case they merely filled the holes up. In spite of this, the pump delivered 980,000 cubic yards after the repair, showing that the owners completed a fine stroke of business in allowing such repair to be effected.

In the present case, the saving will be over $4,000 as a steel casting of the huge size shown would run into quite an expense. On top of that there is the question of delay, so that in many ways the repair proposition is by far the better in this case.

Speaking of the company's activities, Mr. Thompson, the manager, stated that so far this year they had welded 35 boilers on boats at Midland and Port Nichol alone. These included all the C.P.R. passenger boats at these points.

He told of an interesting job performed on the tug Joseph E. Russell. The high pressure cast iron cylinder bottom gland was knocked out, so they proceeded to weld it in place, and made a splendid job of it in quick order. He told of many other jobs performed, but sufficient to state that they have completed various repairs on the great lakes transportation work, from January 1st right up to the 15th of April. They state they had as high as eight machines working at one time.



GENERAL VIEW OF THE OUTFIT AT WORK. A CLOSE UP OF THE OPERATOR.

Improve Your Powers of Perception—Try This Contest

Below will be found twelve references to advertisements in this number. To the sender of the first correct set of answers to these we will forward one of these scales.
To win one is not difficult, and at the same time you will add to your store of knowledge. Read the details given below.

The scale is 6 in. long and is made from finest quality steel. One side is marked in 32nds, the other side in 64ths. A table of decimal equivalents is also stamped on one side, and a table of tap drill sizes on the reverse side. This scale is well worth securing.

What You Have to Do

We publish every week a number of interesting facts or statements selected from the advertising pages for that week. The selections for this issue are given below. Read these through, then turn to the advertising section and see if you can pick out the advertisements to which they refer. The work is interesting, it will train your powers of perception and of memory, it costs you nothing, it will make you better acquainted with the various lines of machinery and tools in the market, and with perseverance you are bound to win one of these useful scales as a prize.

Three contestants submitted correct lists to our April 28th contest, these being A. Baburek, Montreal; W. Cowan, Galt, Ont., and P. O. Nobes, Milton, Queen's County, N.S. Mr. Baburek, however, won out in the elimination test, so that the scale goes forward to him. The winner is foreman of the machine shop in Crane's Ltd., Montreal. Who will be next?

CONTEST FOR MAY 19TH ISSUE

Contestants are required to write us, stating to which advertisements we refer in this number.

1—Something that is always costly.

2—How to keep on the right side of the ledger.

3—Something that has a reversing motor, and gears and rack of steel.

4—A place where engineers are at your disposal.

5—How to get threads accurate in form and pitch.

6—Something that is said to improve the physical properties of well discovered the remainder for yourself.

7—Seven important reasons why you should use—what?

8—A product said to be always on the job.

9—How to secure long, hard, continuous service.

10—A case where Canadian manufacturers benefit.

11—What to do if you want production, improved.

12—How to get away from sliding and slipping.

These are Correct Answers for List from April 28th Issue:

1—E. C. Atkins & Co.

2—Brown & Sharpe Mfg. Co.

3—Smooth-On Mfg. Co.

4—Canada Machinery Corporation

5—Roelofson Machine & Tool Co.

6—H. W. Petrie, Ltd.

7—W. S. Rockwell Co.

8—Torrington Co., Ltd.

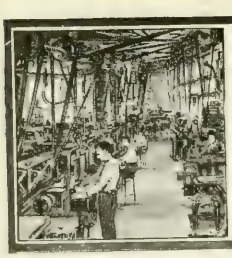
9—Algoma Steel Corporation, Ltd.

10—General Machinery Co.

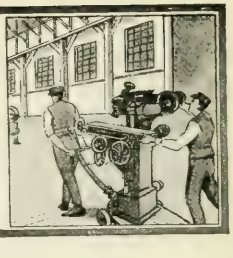
11—Geometric Tool Co.

12—Trabern Pump Division

Closing Date for This Contest is June 9th



DEVELOPMENTS IN SHOP EQUIPMENT



TURRET TOOLPOST

The Lovejoy Tool Co., Inc., Springfield, Vt., has recently placed on the market a turret toolpost. The original Lovejoy positively locked cutter principle is used on all tool-holders which are held in this toolpost, and the turning and facing cutters are adjustable for height as they become worn, which permits their cutting edges to be kept in line with the lathe centre without sacrificing strength and rigidity.

By one movement of the binding lever, the operator can release and accurately index the turret to the next tool position, where it will be securely clamped in place by the completion of the single movement. The turret rings are approximately 4⅝ inches square, made of hardened steel, and are interchangeable on any base. This interchangeable feature permits the use of additional rings carrying a variety of tool combinations for various jobs, without disturbing the individual cutter adjustment, as well as a quick method of changing tools from outside to inside work.

The boring-bars are 1 inch in diameter and are free from projections, and they will cut to the bottom of a hole which is only slightly larger than the bar itself. However, special boring-bars ¾ inch in diameter with bushings can be supplied if desired. The turning tools have a shank diameter of one inch, and are furnished with 19/32-inch high-speed steel cutters. The round shank permits of rotating the holder to produce any desired side clearance, and also provides for a small amount of end adjustment without disturbing the height of the cutting edge, which is a convenience when used on lathes equipped with diameter stops or feed-screws having direct-reading dials. This toolpost will interchange with any regular engine lathe toolpost without requiring any special fitting of the lathe.

ANNEALING FURNACE

The Bellevue Industrial Furnace Company, of Detroit, Mich., are now making a semi-muffle type of annealing furnace adapted to the use of either oil or gas. The oil burners are of the company's own design and are located at the front of the furnace, where they are easily available for adjustment. The gas burners can be substituted when desired. The furnaces are built in six different sizes, the muffles ranging from 56 x 60 x 8 inches to 78 x 120 x 24 inches.

GASOLINE LOCOMOTIVE

The Hadfield-Penfield Steel Co., of Bucyrus, Ohio, are placing on the market the American gasoline locomotive, a machine that is intended for light haulage where steel rails are used, such as the transportation of material for construction work, in steel mills and yards, quarries and coal mines. The engines are constructed in several designs and gauges to suit a variety of purposes. The power is supplied by a heavy duty Hercules, 4-cylinder, 4-cycle, gasoline engine. The crankshaft is of five-bearing design and is provided with a force feed oiling system. New Departure and Hyatt ball and roller bearings are provided in the transmission. The drive from the motor is through friction discs and the speed may be varied to suit conditions, the control lever being directly in front of the operator. The jack shaft is driven by a roller chain and it in turn drives all four wheels, the latter being 18 inches in diameter.

SENSITIVE DRILLING MACHINE

The sensitive drilling machine, formerly built by the Mason-Widmer Co., has been redesigned by the Providence Engineering Co. and placed on the market. The machine is fully equipped with ball bearings and the spindle equipped with a reservoir in the sleeve for retaining the lubricating oil. Special design of the sleeve prevents the throwing of the oil. Shifting of the belt is made by means of a crank in front of the machine, the shifter being automatically locked in position after the shift has been made. The belt is under tension only when the machine is in operation. A telescopic screw provides vertical adjustment of the table. The machine can be belt or motor driven, the latter being through horizontal or vertical shafts. Machines can be made with any number of spindles and automatic power feeds and tapping attachments can be furnished if desired.

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If You Haven't Landed a Scale Up to the Present Date, Decide to Dig in and Get One This Time—Send Your Lists in Early.

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No Protection Given to Locomotive Tyre Plant

Armstrong, Whitworth of Canada Closing Their Plant at Longueuil—Will Take Up Representation of Parent Company And Allied Firms — May Manufacture in Dominion at Future Dates as Business Develops

It has already been announced that the Longueuil plant of Armstrong Whitworth of Canada is being closed down and we take this opportunity of giving a short history of the factory.

Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., of England, originally decided to erect a subsidiary plant in Canada in 1913.

Sir Percy Girouard, of Montreal, who had been with Lord Kitchener in Egypt and South Africa, made the preliminary survey and chose Longueuil as the site for the new works. He was the first president. M. J. Butler, as managing director, designed and organized the works. The board of directors included H. H. Vaughan, of Montreal, who at one time was mechanical superintendent of the Canadian Pacific Railway, Senator Geo. G. Foster, K.C., of Montreal, and H. B. Walker, manager of the Montreal branch of the Canadian Bank of Commerce.

The original scheme of development was along the lines of tool steel and small tool manufacture, but arrangements were made whereby a larger scheme, including the erection of docks, etc., could be considered. The first plant installed was crucible steel making, steam hammers, rolling mills and a modern small tool shop. The first steel was melted in November, 1914, and the company quickly gained a high reputation for its crucible steel and engineers' small tools.

In 1916 it was decided to lay down a plant for the manufacture of steel tires and wheels, with the expectation and understanding that the company would ultimately receive adequate tariff protection.

Mr. Butler carried out the new installation with his customary energy, assisted by Mr. Bristol. The sales side was handled by Lawrence Russel, who was at one time with the Canadian Fairbanks-Morse Co.

Owing to the war in Europe the parent company could not spare as many skilled operators and technical assistants as they had planned, and the Canadian management had to make the best use of the material at hand.

Tires were first rolled in June, 1918, and were supplied to all the Canadian railways, and were also exported to Australia, the Netherlands and South Africa, etc.

A great part of the raw materials necessary for the production of steel for tool steel, tires, etc., has to be imported from the United States or England, and customs duty must be paid for such material. Tool steel and small tools have a measure of protection, but locomotive tires may be imported free, if they are brought into Canada unmachined. Under these conditions the home market can be undersold.

Mr. Butler resigned shortly after the termination of the war, owing to ill-health.

Sir Percy Girouard paid an extended visit to this country at the beginning of 1919, and Lawrence Russel was appointed to the board as director and general manager and Herbert Johnson was appointed works superintendent.

At the end of 1919 Arthur Wheatley, at one time manager of the Montreal Locomotive Works and Lima Locomotive Works, was appointed president and commenced to reorganize the company.

Decided to Close Plant

It was thought advisable by the English company that a thorough investigation be made into the general situation, and D. E. Grant, who had previously visited the United States on their behalf, was sent to Canada as general manager six months ago. He re-visited England in February of this year, and upon his return to Canada the directors at the annual meeting in Montreal decided to close the works and dispose of the plant at Longueuil.

Mr. Grant is remaining as general manager until the affairs of the company are settled, and new business arrangements made. Lawrence Russel and Mr. Wheatley have resigned.

It is the intention of the company to take up the representation of Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., and their allied firms in England. These comprise: Armstrongs & Main, Ltd., Crompton & Co., Ltd., Armstrong Siddeley Motors, Ltd., the Pearson & Knowles Coal & Iron Co., Ltd., Partington Steel & Iron Co., Ltd., Rylands Brothers, Ltd., etc.

Have Russian Contracts

Among commercial products the parent company are famous for their high-grade steels and tools, and have recently made further developments with their water turbines which have been supplied to various countries. They have the largest shipbuilding capacity in the world, and also the largest single locomotive works. They are supplying South America, Africa, Belgium, Australia, China, India, etc., with locomotives, in addition to the English railways, and they have just arranged a contract for the repair of all the Russian state locomotives to the number of over 9,000.

It is not possible in this article to do more than mention their machine tools, handling machinery, etc., but since the termination of the war their large munition plants have been partially dismantled and turned over to commercial uses.

This article would not be complete without reference to the Armstrong Siddeley automobile, which is built in Coventry, England, and which is considered to be of the highest grade of English motor cars. A service station and show room have been established at the headquarters of the company at 298 St. James Street, Montreal, where all business is handled.

It is the intention of the company to dispose of the entire plant at Longueuil, including land and buildings, but they are expecting to develop their import business so that ultimately they may again commence manufacture in the Dominion.

THE CORROSION OF IRON

In the "Transactions" of the American Electrochemical Society, two investigators (E. A. and L. T. Richardson) point out that copper and manganese have a mutual action in their effect on the atmospheric corrosion of iron. Copper alone reduces the corrosion of pure iron, and to a still greater extent that of steel containing manganese, the latter enhancing the effect of the copper. If manganese is replaced by chromium the effect is still more pronounced. The authors consider that in commercially pure iron the presence of copper produces an intergrain film of oxide or other compound of iron, and that this film confers rust-resisting properties on the iron. Between 800 and 1,000 degrees C. this intergrain material becomes weak and plastic, producing red-shortness in the iron. Additions of manganese and chromium result in a smaller grain size, and consequently increase in resistance to corrosion. These elements also lower the red-short range of temperature, and if present in sufficient quantities this range occurs at a temperature below that at which the intergrain film becomes weak or plastic.

CANADIAN MACHINERY
AND MANUFACTURING NEWS

Published in the Interests of the Machinery, Manufacturing, Iron, Steel, and Metal Working Industries.

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The Danger of Liquidation

HOW long can the process of liquidation be carried on without setting market standards that are not based on actual costs and legitimate profits?

A large number of firms, dealing in iron and steel lines, as well as in some lines of tools and equipment, have been unloading surplus and high price stocks for some months. The same thing has been done in almost every other line, but we are particularly interested in those enumerated above.

A firm has a line—take, for instance, bars—on which they are overstocked with material brought in when the price was well above to-day's figure. In order to clear out they decide to take their loss and according to the urgency of the buyer or the demands of their own finances, a figure is arrived at and the sale is made. The buyer gets a special price for a special reason. That fact becomes known. This buyer tells his friends; it may be that market reports carry the item. Other buyers may get the same treatment for the same purpose and each time this special price is repeated it becomes more firmly established.

Buying is being done in small quantities now and it is quite possible that the same buyer may come back several times and get the same special price.

When this stock is disposed of the dealer goes into the new markets. He has taken his losses and, according to practice, should be able to go ahead and make a profit on future operations. He takes in his new stock of bars; he knows what they cost at the mill and he knows exactly what it will cost to put them in his yard and handle them. On these known facts he bases his new price, higher than the liquidation price of his old stock.

We know of cases where this has happened and where buyers have taken their business away because a dealer was trying to get from the period of liquidation to where he could do business on a decent basis.

The problem is this: How is the trade going to definitely and safely arrive at a point where liquidation ceases and business commences again on the basis of known costs and known profits? Liquidation may be necessary and it may benefit the few, but it is a state of trade that is not nearly as beneficial to the many as when business is being carried on at a reasonable profit to all concerned.

Buyers should be reasonable in this respect. They know mill costs, freight, duty, exchange and all such items—there is no mystery or secrecy about it all. They must also realize that there must come a time when forced selling must give way to profitable dealing if firms are not going to commit commercial suicide.

Hurting a Good Customer

THE idea that the coal strike in Britain is a matter that concerns the people in that country alone is too narrow to last.

The last market letter of the Hayden, Stone Co., of Boston, makes this point very clear:

"The cloud overhanging England by reason of the coal strike is spreading. The loss already sustained is tremendous; if continued it will greatly impair the purchasing power of our best customer."

United States is more liable to the reflection of English conditions than many American people care to admit.

A New York publisher, discussing this matter with this paper a short time ago, stated "If Britain can smash this present strike her stock will go up 100 per cent. here over night. Our manufacturers tell us that their works are very quick to follow the lead of British labor leaders and when a new move succeeds in England it is only a matter of weeks until the same move is made in some of the larger plants in United States."

Despite all the tail twisting that the radicals in United States may do, the business interests there are quick to realize that British buying power is a great big factor in keeping United States busy.

A report in one of the Toronto daily papers makes the claim that the booster engine, now being used on locomotives in this country, will "triple the load-carrying possibilities of engines on sharp grades." This would call for triple the amount of steam. Even the booster engine's best friends never made such a claim for it.

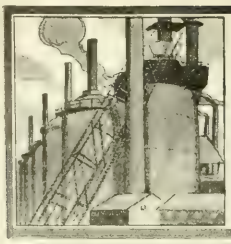
The Plea of Lincoln

"CAPITAL has its rights which are as worthy of protection as any other rights. Nor is it denied that there is and probably will be a relation between labor and capital producing mutual benefits.

"The strongest bond of human sympathy outside of the family relation should be the one uniting all working people of all nations, and tongues and kindreds. Nor should this lead to a war upon property or the owners of property. Property is the fruit of labor; property is desirable; is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise.

"'Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built.'"

—A. Lincoln.



MARKET DEVELOPMENTS

A Slight Improvement in Some of the Markets

Pittsburgh Reports That Steel Mills Are Rolling About 30% This Week—Liquidation Price Seems to Have a Direct Bearing on the New Values—Orders Received Are Still Very Small

THE matter of turning from the period of liquidation to straight business once more is occupying the attention of dealers in the iron, steel, and to some extent in the tool market. For some months dealers have been engaged in reducing their stocks and for this purpose they have, in many cases, given special prices, especially in lines where they were heavily stocked with high-cost goods. In a number of cases quite recently dealers have been able to buy in the new market, add their profits and ask for a price in excess of the liquidation figure. Buyers are not ready for the change and realize that they are still in possession of the market and this tendency is making it hard for business generally to get away to a fresh start, as the liquidation price is still held as the figure for the market to follow.

During the week that has passed dealers in several lines reported better business than they have had for some time. They do not regard this as evidence of a turn for a bigger buying movement, but they are pleased to take it for what it is worth, and call it a good week's selling.

Prices have come down perhaps a little during the week, but the movement in that direction is very gradual, as most of the lines have already been reduced. Bar mill material is quoted around 3.75 per pound and cold rolled shafting at 6.50 base.

Business placed during the last few days centred around sheets and structural, the latter being for bridge work.

The scrap metal market continues in a poor way. The volume of business done is very small. One of the large dealers claims that his firm has not a single contract at the present time, nor is it anxious to make one, because it would be unable to buy at the low figures going at present.

Nearly all the business moving is being done in very small lots. One yard reports that a three-ton truck went out on a recent trip and took with it 40 orders, whereas in normal times three orders would fill the truck. Some of the yards are finding it necessary to make a special charge for delivery under a certain weight or value.

BUYING BY POUNDS RATHER THAN TONS IN MONTREAL STEEL MARKET

Special to CANADIAN MACHINERY.

MONTREAL, May 19.—The optimism that has been more or less marked in many quarters during the past several weeks seems to have attained the point of actual realization, if one can judge from the reports of some dealers in steel and machinery that general inquiry has improved. This does not mean that business has shown any marked improvement, but dealers are undoubtedly encouraged by the recent trend of inquiry from manufacturers and contractors.

Steel Buying Light

There is little showing on the surface to indicate that the present market differs any from that of previous weeks this year, but veiled reports seem to bear out the statement that "sales are made at prices below these generally quoted." There is a feeling that further declines are scheduled in steel commodities and this is probably having an influence on dealers who have considerable stocks on hand. The demand has not shown any marked increase but some think a slight improvement is beginning to develop, and that this will gradually increase as industry becomes more settled. The business passing at the moment is for small quantities, and might be classed as "poundage" rather than "tonnage." "It is more common to get an order for a single plate or sheet than for a supply on a tonnage basis," was the remark of a dealer. "We are still expecting an announcement of lower prices from the American mills, as European producers are making inroads into the market here. Of course, no heavy buying is taking place yet, but the situation is one that will need watching." The movement of tubes and sheets has improved slightly, but not sufficient to affect quotations. Prices continue unchanged and firm. The surcharge on American freight shipments for the current period is 7 per cent.

Machine Tool Inquiry Improves

Machinery dealers, like many others in the metal working trades, are living in the hope that the time is not far distant when buying will take place on an increasing scale. Few expect to see a brisk revival of consumer demand, but the fact that manufacturers are still refraining from unnecessary purchase of equipment leads many to the belief that a revival of normal business would be followed by steady increase in the demand for all classes of machinery and supplies. Early this week a dealer was remarking on the better tone of machine tool inquiry. "We cannot say that any large orders are coming in," he stated, "but the aggregate volume of a widely distributed demand for light tools and shop supplies shows a better turnover than for some time past. The necessary details in the handling of business of this character entails considerable additional work, but the field of activity is being widened, although the fruits of cultivation are ripening slowly and the harvest is still uncertain." The optimism seems to be growing out of the knowledge that costs of production are gradually declining in many lines of industry, a fact that will eventually be reflected in normal business enterprise. "The better tone," remarked a dealer here, "is evident from the increasing inquiries coming to hand. These are of the fluctuating variety, a score today and probably only three or four tomorrow, but the general trend is to renewed interest. When followed up, many of these inquiries are found to be just feel-

ers, but in nearly every case the need for equipment is evident, but actual buying is still deferred. When business does revive, however, we look for quite a bit of buying." Prices, in general, on machine tools are holding firm, but with cost of production on the decline lower quotations are an early possibility.

Non-ferrous Lines More Active

Operations in old materials are confined to the movement of small quantities, local foundries taking the bulk of the movement. The situation has little of interest at present and dealers are refraining from predicting any activity during the next few weeks. "We were expecting a slight revival following the recent steel developments in the States," said a dealer, "but trading is still very quiet, although reports appear to indicate that the market may become stronger at any time." The non-ferrous lines have been a little more in demand and this is reflected in the higher quotations on some metals, notably brasses and leads. Red brass turnings are quoted at 8 cents, an advance of ¾ cent per pound. Light brass at 4¼ cents shows a similar rise. Heavy lead is quoted at 4¼ and tea lead at 2¼ cents, an advance of ½ cent and ¼ cent respectively.

A GOOD WEEK FOR SEVERAL CONCERNS

Dealers in Steel and Small Tools Had a Fairly Good Run of Business During the Week

TORONTO.—At several places in the markets this week were found cases where firms had done a fair business during the week. In no case was there a belief that it meant a return of bigger buying, but it goes to show very clearly that stocks are reduced very considerably, and that there must be a certain amount of buying done in order to keep going, and a great deal some time in the future in order to get stocks in shape for normal operations.

The wood-working end of the machine tool business still has the better of the metal-working section. This is the experience of several dealers, and one of the manufacturers of both kinds of tools stated that the wood-working department was doing quite a bit more business than the metal-working now. The machine tool plants are not busy. Most of them are running short time, although wages are being fairly well maintained. A representative of one of the companies stated just a few days ago that they considered it too much to cut hours of work and rate of pay at the same time. Of course, he admitted, running short time at a fairly high rate of pay is an expensive way to carry on, but there appeared no other way out, even if the method did not help the firm to bring down the cost of the finished article.

Another dealer stated that his small tool business had been very good during the past week, much better than for some time past. He did not consider that this meant a permanent betterment, but he was glad enough to take what was coming for the week and call it a good week. There are still some industrial establishments selling out their stock of small tools, so the dealers are hardly looking for any business from these places yet. A year ago they were in the market almost every day for some sort of small tools.

Some Good Steel Business

At three different places in the steel market the report was received of a very nice volume of business having been done during the last week. But these dealers all took great care to make it plain that they did not look upon this as showing signs of a buying movement. "It means," stated one firm, "that stocks are very low, and that buying at times must be done." The business reported during the week was spread over a number of lines, taking in some nice sheet business, also the placing of a nice tonnage of structural, but most of the latter was for bridge building. Structural for the purpose of buildings, such as factories, offices, etc., is not moving very freely yet.

Market Still Irregular

The local steel market is still in a rather ragged shape, and a good many prices are quoted for a given article. Mills are doing some very close figuring, too, when a fair-sized tonnage comes up, and on one order recently as low as 3.25 was done on bars by a Canadian mill. Warehouse prices on bars are not definitely fixed. It is impossible at times to distinguish between a liquidation price and a regular price cut to suit a special case. The bar market is, officially, 3.75 for large orders and 4c for small lots, although there have been sales for below 3.75 where the tonnage was quite small.

One dealer brought out the idea that if the process of liquidation kept up long enough, the liquidation price would come to be accepted as the standard of the market. "We find," he stated, "it is harder to come back to a regular price after doing business with a firm on a price we have given in order to get rid of certain stocks we have on hand. There is a decided tendency for the trade to hold that the liquidation price is the market price, and all that is necessary to establish this is to keep up the period of liquidation long enough. You can explain to a keen buyer as much as you like about your liquidation, and all the rest of it, but he simply waits for you to get through with the explanation, and then comes back, 'Well, here's my business if you can give it to me at the same price as the last order.'"

Very Small Buying

Another dealer stated that for the last month he had as many orders going through as the same month last year, and yet on the total there would not be much over 30 per cent. of the volume of trade. Orders were being placed now for the materials that were urgently needed, and nothing for stock or future operations. "One of our three-ton trucks went out last week, and it had forty orders on it," is the experience of one yard, "and we are seriously considering now making a hard and fast dead line, and anything under that amount will have to stand a special charge for delivery."

In the Scrap Metal Market

The trade here continues much the same as it has for a good many months. In fact it has been poor for almost eight months. The keen edge had gone off the scrap trade some weeks before other lines started to tighten up. Dealers look for the copper market to recover before the others this time. When copper starts of course it will take spelter and other alloys with it. Copper is below a fifteen-year pre-war average to the extent of 20 per cent. at least; steel is a little down but iron is not. The yards around here have no more contracts as a general thing. The largest of these stated that they had no contracts at all now. They were all run out and they were not keen to make new ones. Most of the interests that have scrap to sell have become tired of offering it on account of the low price that is offered. The dealers themselves, if they are able to do so, prefer to hold to their stocks rather than let them go out on the present low market.

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh says the steel mills are running at about 35 per cent. this week, taking in both Corporation and independents.

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One three-ton truck left the warehouse of a Toronto steel merchant a few days ago and took 40 orders. Some of them are going to make a charge for delivering under certain amounts.

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British coal strike is interesting U. S. circles as the latter see where it is interfering with the purchasing power of their best customer.

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German reports give the current prices on some steel and iron lines, as ingots $1.15 per hundred pounds, structural shapes $1.55, bar iron $1.55, thick sheets $1.69.

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Scrap markets remain dull. Very little business is being done. Dealers are buying only for purposes of resale at once.

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Small tool sales were better during the past week, quite a number of fair sales being reported.

PITTSBURGH WAITS TO SEE REAL TEST IN STRENGTH OF STEEL PRICES

Special to CANADIAN MACHINERY.

PITTSBURGH, May 19.—Production of steel ingots in the United States in April, as may be estimated somewhat closely from the partial report of production issued by the American Iron and Steel Institute, was at the rate of about 16,000,000 gross tons a year, or between 30 and 31 per cent. of the capacity, which is approximately 52,500,000 tons a year. The independents averaged an operation of 22 or 23 per cent. and the Steel Corporation ran at between 40 and 41 per cent. Production at the present time is if anything a shade lower than the average of April, perhaps 20 per cent. by the independents and 37 or 38 per cent. by the Steel Corporation, or between 27 and 28 per cent. for the industry as a whole, say 14,500,000 or 15,000,000 tons a year.

It seems like an extremely small production for the industry to be running at 30 per cent. of capacity or less, but in actual tonnage the comparison is somewhat different. Taking the output at 15,000,000 tons a year, two comparisons can be made. By far the heaviest tonnage years before the war were 1912 and 1913, each year showing an output just a shade above 30,000,000 tons, and 15,000,000 tons is one-half that. Again, in 1902 there was what was considered an extremely heavy demand for steel. Everybody was buying. The railroads were buying cars, locomotives and rails very freely, large bridges and buildings were being erected and there was much activity in all classes of machinery. Practically every ton of steel was made that could be made, and the output was only about 14,500,000 tons. Yet the steel industry of 1902 was regarded as a very big thing.

To consider the matter in another way, the production of steel is large considering that nearly all business is stagnant, while some consumers, and perhaps quite a large proportion, are drawing upon stocks previously accumulated, and are consuming more steel than is being produced. At 15,000,000 gross tons of ingots a year the production of finished rolled steel is close to 250,000 net tons a week, and that looks like a great deal of steel if one tries to pick out the lines in which it is being consumed. Yet this amount of steel, and probably more, is being consumed from week to week.

Steel Prices

The equalization of steel prices as between the Steel Corporation and the independents, by the independents advancing their prices on most products and the Steel Corporation reducing its prices, was completed by April 15, and the question since then has been whether the new prices would hold, or for how long. The real test would hardly come at the outset, since while the independents were withdrawing their previous low prices they allowed buyers to cover for as much as they wished, provided they would supply actual shipping orders. By this means all the loose business in sight was gathered up, and for two or three weeks afterwards there were reports of fresh bookings being taken at the old prices on the basis—or subterfuge—that the old price had been kept open. Naturally there has been little new business in the market in the past fortnight, and so the new prices have not had much of a test. The buying in no case ran beyond May, and thus it is necessary now both for the mills to effect some more sales and for consumers to buy some more material. The real test of prices is now to be made, and it will be seen whether the independents will shade prices as they began doing in February. As the summer is always considered a dull period, it is thought that if prices hold to the middle of June they will stand unchanged through the summer.

A few cases of irregularities are reported now, but they refer to large tonnages and would not set the pace for the ordinary run of orders. An oil company is said to have been quoted $3 a keg against an inquiry for 4,200 kegs of wire nails, the regular price being $3.25, while the Ford Motor Co. is stated to have been quoted 2.40c on hot rolled strip, when the regular market is 2.75c. The Ford inquiry was for 4,000 tons, but whether the full tonnage was bought is not known.

Of course it is well understood that the present steel prices cannot be expected to last indefinitely. If there were a full demand for steel, or even a demand to engage 75 per cent. of the steel making capacity, the mills would be quite willing to sell at lower prices, and competition would cause them to do so, whether willingly or not. When demand is so light operating costs are very high and there is no real profit even in the present prices. The mills are convinced that lower prices would not make greater demand at this time. When buyers show that they would buy more freely if prices were lower the mills will meet them half way or more than half way.

A sale of 2,000 tons of basic pig iron has been made at $22, valley, to a steel works at Sharon that for several weeks had been buying small lots at $22.50. The transaction is interesting as the previous sales had been made by a steel company that had some surplus iron, the merchant furnaces being unwilling to sell so low and having a policy of keeping out of the market until the steel works had disposed of their surplus. By a change of policy a merchant furnace took the 2,000-ton order at 50 cents less than the steel interest had been doing. Foundry pig iron is also down 50 cents, as it is offered by at least one furnace interest at $23.50, valley. Bessemer, on which there was a nominal quotation of $25, is now offered at $24, valley.

While pig iron is declining, it is declining very slowly, and cannot be far from bottom for the next few months. Later, of course, there may be such reductions in the freight cost of assembling raw materials as to bring about a further decline. Pig iron can hardly get to $20 with present freights and wage rates, which make a big difference. Just before the war basic iron sold at $12.25, that being considered a very low price. On the other hand, at the top last August foundry iron was $50, valley, and Bessemer and basic $48.50. Striking an average of all the important pig iron districts, the market declined about $5 a month during the last three months of last year, about $3 a month during the first three months of this year and about $1.50 in the month of April, while since the beginning of this month the average has gone down only about 50 cents.

Connellsville coke has weakened somewhat further. No sales of furnace coke to blast furnaces are reported, but what has been called standard furnace coke has sold to other consumers at $3.25. The market may be quoted easy at $3.25 to $3.50. As to foundry coke, it has lately been quotable at $5 to $5.50, there being ordinary brands available at $5, while one favorite brand has been $5.25, selling in a limited way, and two at $5.50, selling in a very limited way, but in the past few days it appears some standard coke, though not perhaps of the best quality, has sold at $4.75 or possibly even $4.50.

LOCATING A RAILWAY BY AEROPLANE

According to a news letter of the Air Service, United States Army, locating a railway by aeroplane has been carried out by the 3rd Aero Squadron, Camp Stotsenburg, Philippine Islands, and one long flight has enabled a railway engineer to determine which one of three general routes will be used for the new road. It is stated that many months and thousands of dollars have been saved in the work. Instead of three parties of locating engineers being sent out to make the survey, only one will now be necessary. The new line is projected by the Manila Railroad Co. as an extension of its line from Cabanatuan, through parts of the provinces of Nueve Ecija and Nueva Vizcaya to Bayombong. The first trip was made with the chief engineer of the railway, passing over Mount Arayet and then following the Pampanga River until the railroad line was picked up at Gapan. The river was followed from Cabanatuan on to Pantabangan and over Mount Pangloriahan, thence to Bayombong.

What Happens in the British Industrial Field?

One Firm Has an Order For Repairing Many Russian Locomotives—Railways Treating Old Employees Fairly—Rolling Mill Engine Has Great Power

LONDON, ENG. — (Special correspondence to Canadian Machinery).—A short time ago it was recorded that a leading British firm had received a contract for the repair of a large number of locomotives for railways in Russia. This contract alone is estimated to provide employment for about two thousand men for some years; and since it has been awarded the same firm has secured an order for two hundred locomotives for the Belgian State Railways. A striking feature of this new order is that it was secured in the face of the keenest foreign competition.

British Oil Enterprises

ON a site about four miles from a large British port a British oil company is erecting a huge plant for the storage and refining of oil. A new village has been built in the neighborhood of the plant for the accommodation of the work people and staff connected with the enterprise. Between the plant and the port a pipe line has been constructed and the first cargo of oil, brought by a British tank steamer, was recently sent along the pipe. So ambitious is the whole scheme that a statement has gained currency to the effect that the cost was about £8,000,000. The more accurate figure of £4,000,000 however, indicates well enough the importance of this development of oil supply in Great Britain.

British Industrial Generosity

THE spirit in which British industrial concerns interpret their duty to their employees is exemplified by the action taken by two of the leading railway companies in connection with superannuation allowances for old servants. Owing to the change in the value of currency since the war the original allowance had become inadequate and the companies voluntarily decided to increase the allowances to superannuated servants and also to improve the scale of benefits for those servants entitled to superannuation. This action is all the more striking as the only fund at present available for such concessions is the dividend fund. The additional amounts, therefore, come out of the shareholders' pockets.

Rolling Mill Engine

WHAT is claimed to be the most powerful rolling mill engine in the world is now in course of erection in a British steel works. It is intended to drive a train of 32-inch finishing rolls for large sections of steel. Some idea of the enormous size of the engine may be gained from the fact that the face of a man standing on the ground just comes to a level with the crank shaft—the engine being a vertical one. The maximum horsepower developed is 25,000 at a speed of 140 revolutions per minute. There are three cylinders, each 45 inches in diameter and with a stroke of 52 inches. Joists up to 24 inches deep and 12 inches wide will be rolled in this mill. The makers have given a guarantee that this huge engine will be capable of reversing four times in one minute, and they are confident that the engine will do better than the guarantee. This rapidity of reversal, which is of great value in increasing output, is secured by a most ingenious system of valve gears. The engine is carried on a massive concrete foundation with an iron casting two feet deep—weighing over 100 tons—embedded in it. Small auxiliary engines are used to operate the reversing gear and also the stop valves.

Testing Engine Crank Shafts

WHEN an engine is built, one of the items to be tested is whether the crank shaft is in strict alignment; and in order to ensure the satisfactory running of the engine, tests with a similar object should be made periodically. A British engineering firm recently introduced a new instrument for making such tests accurately and rapidly. It consists of a dial divided into thousandths of an inch and a pointer actuated by a plunger which juts out at the top of the dial. Flanking this plunger are two spring plungers; the dial is carried on a column which screws into a base. The apparatus is used—in a manner which cannot be described without technical details—to measure the distance between the inner faces of the crank balance weights or of the outer ends of the crank webs, first when the shaft is in one position and next when it has been moved through half a revolution. If the pointer shows a movement to one side or the other it proves that the alignment is not correct. This instrument is made either non-adjustable, for only one size of crank shaft, or adjustable for any sizes in which the distance between the web is not less than 4½ inches or more than 9½ inches. It can be used for either horizontal or vertical engines.

The Silent Exhaust

THE problem of silencing the exhaust from internal combustion engines has engaged the attention of engineers for many years and countless devices have been invented with more or less success for the purpose. Hitherto the appliances required for the marine type of internal combustion engine have occupied a good deal of space and added considerably to the weight of the vessel. In order to overcome these drawbacks a British firm of engineers has devised appliances in which the energy of the exhaust gases is used to put in motion a comparatively large body of cooling water or air. The exhaust gases are forced to come out from below a large spring-loaded valve in a stream between two plates under water, inducing the water to circulate and cooling themselves at the same time. The only resistance offered to the flow of the gases is the light resistance of the spring and of a few inches of water, so that very little back pressure is exercised. Where air cooling is used, a similar principle is adopted. Both types have been successfully at work for some time, the former on engines up to 10,000 brake horse power and the latter on engines of 1,500 brake horse power.

Supremacy of British Shipbuilding

IN a recent speech the British Shipping Controller spoke with reasoned confidence of the ability of the British shipbuilding industry to hold its own against all comers. Years and years of preparation and experience were necessary for a nation to build up a great shipbuilding industry, and Britain alone had passed through that essential period. He saw great advantages too, from the difficulties which surround all industrial enterprises at the present time. Improvements did not come when business was good and everything was booming; genius and ability came to the front in time of depression. Speaking of the future of the oil engine for marine purposes—a field in which British marine engineers are making rapid strides—he referred to a British ship of 12,000 tons which had been out to the Far East and back at a speed of 12 knots and a consumption of oil of only about 20 tons per day. A steamship would have required about 80 tons of coal per day.

Pneumatic Grain Unloaders

PNEUMATIC plants for discharging grain from ships have come largely into use during recent years on account of the saving in manual labour for handling and trimming and also because of the comparative absence of dust. During the war a number of self-contained floating grain plants were supplied by a British firm to the French Government to handle the increased imports of grain necessary owing to the reduction of agriculture in France. The same firm recently constructed a similar floating plant with the large capacity of 180 tons per hour. It is a combination of pneumatic and hand conveyors for simultaneously discharging from a grain ship through spouts to lighters and by means of the band conveyor across the deck of the ship to bands below the quay. The plant is erected on a pontoon which is brought alongside the ship to be emptied. Although designed for 180 tons per hour, this equipment proved able, on a recent test, to discharge at the rate of 200 tons per hour, the highest capacity being 216 tons per hour for two consecutive hours.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

rey forge, Pittsburgh	$25 00
ake Superior, charcoal, Chicago	40 50
tandard low phos., Philadelphia	41 50
essemer, Pittsburgh	28 96
asic, Valley furnace	26 00
oronto price:—	
ilicon, 2.25% to 2.75%	34 10

IRON AND STEEL

Per 100 lbs. to Large Buyers	Cents
on bars, base, Toronto	$3 75
teel bars, base, Toronto	3 75
on bars, base, Montreal	3 75
teel bars, base, Montreal	3 75
einforcing bars, base	3 75
teel hoops	4 50
ire steel	4 00
pring steel	6 00
and steel, No. 10 gauge and 3-16 in. base	4 00
hequered floor plate 3-16 and heavier	6 00
essemer rails, heavy, at mill	2 35
teel bars, Pittsburgh	2 10
ank plates, Pittsburgh	2 20
tructural shapes, Pittsburgh	2 20
teel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
mall shapes	4 50
F.O.B. Chicago Warehouse	
teel bars	3 48
tructural shapes	3 58
lates	3 78
mall shapes under 3-in.	3 48

FREIGHT RATES

Per 100 Pounds.

Pittsburgh to Following Points	C.L.	L.C.L.
Montreal	58½	73
St. John, N.B.	84½	106½
Halifax	86	108
Toronto	38	54
Guelph	38	54
London	38	54
Windsor	35	50½

Current surcharge, 7 per cent.

METALS

	Gross. Montreal	Toronto
Lake copper	$18 00	$17 50
Electric copper	17 50	17 50
Castings, copper	17 25	18 00
Tin	38 00	39 00
Spelter	7 75	7 50
Lead	7 25	7 50
Antimony	8 00	8 25
Aluminum	34 50	30 00

Prices per 100 lbs.

PLATES

Plates, 3-16 in.	$5 00	$4 75
Plates, ¼ up	4 50	4 25

PIPE—WROUGHT

Standard Buttweld Pipe S/C

Per 100 feet.

Size	Steel Blk.	Steel Galv.	Gen. Wrot Iron Blk.	Gen. Wrot Iron Galv.
⅛ in.	$ 6 50	$ 8 50	$	$ ....
¼ in.	4 80	6 99	5 91	8 01
⅜ in.	4 80	6 99	5 91	8 01
½ in.	6 50	8 03	7 95	9 48
¾ in.	7 99	10 06	9 95	12 02
1 in.	11 82	14 88	14 71	17 77
1¼ in.	15 99	20 13	19 90	24 04
1½ in.	19 11	24 06	23 79	28 74
2 in.	25 72	32 38	32 01	38 67
2½ in.	40 66	51 19	.....	.....
3 in.	53 17	66 94	.....	.....
3½ in.	67 62	84 18	.....	.....
4 in.	80 12	99 74	.....	.....

Standard Lapweld Pipe S/C

Per 100 feet.

Size	Steel Blk.	Steel Galv.	Gen. Wrot Iron Blk.	Gen. Wrot Iron Galv.
2 in.	$29 42	$36 08	$35 71	$42 37
2½ in.	44 17	54 70	54 11	64 64
3 in.	57 76	71 53	70 76	84 53
3½ in.	69 46	86 02	85 10	101 66
4 in.	82 30	101 92	100 83	120 45
4½ in.	95 89	1 20	1 30	1 54
5 in.	1 12	1 40	1 52	1 80
6 in.	1 45	1 81	1 97	2 33
7 in.	1 89	2 37	2 53	3 01
8L in.	1 99	2 49	2 66	3 16
8 in.	2 29	2 87	3 07	3 64
9 in.	2 74	3 43	3 67	4 36
10L in.	2 54	3 18	3 41	4 05
10 in.	3 28	4 10	4 39	5 21

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4-in. and under, 50 per cent.
4½-in. and larger, 40 per cent.
4-in. and under, running thread, 20%.
Standard couplings, 4-in. and under, 20%
Dd., 4½-in. and larger, net.

OLD MATERIAL

Dealers' Average Buying Prices

Per 100 Pounds.	Montreal	Toronto
Copper, light	$ 8 50	$ 9 00
Copper, crucible	11 00	11 00
Copper, heavy	10 50	11 00
Copper wire	11 00	11 00
No. 1 machine composition	9 50	9 75
New brass cuttings	6 00	8 00
Red brass turnings	8 00	8 00
Yellow brass turnings	5 00	6 00
Light brass	4 25	5 00
Medium brass	4 50	6 00
Scrap zinc	4 00	4 00
Heavy lead	4 25	4 00
Tea lead	2 25	2 00
Aluminum	12 00	10 00

	Per Ton	Gross
Boiler plate	$10 00	$12 00
Heavy melting steel	9 00	14 00
Axles (wrought iron)	20 00	20 00
Rails (scrap)	12 00	14 00
Malleable scrap	12 00	20 00
No. 1 machine cast iron	22 50	25 00
Pipe, wrought	8 50	8 00
Car wheel	22 00	25 00
Steel axles	18 00	18 00
Mach. shop turnings	5 00	6 00
Stove plate	17 00	20 00
Cast boring	3 00	7 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, 7-16 and up	Net list
Carriage bolts, ⅜" and less	15
Coach and lag screws	—20
Stove bolts	55
Wrought washers	—25
Elevator bolts	Net
Machine bolts, 7-16 and over	—5
Machine bolts, ⅜-in. and less	—30
Blank bolts	Net
Bolt ends	—5
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	+25
Machine screws, fl. and rd. hd., brass	Net
Machine screws, o. and fil. hd., brass	Net
Nuts, square, blank	+25 add $2 00
Nuts, square, tapped	add 2 25
Nuts, hex., blank	add 2 25
Nuts, hex., tapped	add 2 75
Copper rivets and burrs, list less	27½
Burrs only, list plus	10
Iron rivets and burrs	37½ and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	67½
Wood screws, flat, bright	67½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent
Set screws	Less 40%
Square and hexagon head cap screws	Less 30%
Round head cap screws	Plus 10%
Fillister head cap screws	Less 10%
Flat head cap screws	Net list
Button head cap screws	Plus 10%
Studs	Less 20%
Semi-finished nuts up to and including 1-in.	Less 35%
Semi-finished nuts 1⅛ to 1½"	Less 30%
Semi-finished nuts 1⅝ to 2 in.	Net list
Coupling bolts	Plus 10%
Taper pins	Less 40%
Planer bolts without fillet	Plus 40%
Planer bolts with fillet	Pus 50%
Patch bolts	Plus 80%
Hollow set screws	Plus 20%
Thumb screws	Less 35%
Thumb nuts	Less 65%

BILLETS

F.O.B. Pittsburgh.

	Per gross ton
Bessemer billets	$43 50
Open-hearth billets	43 50
O.H. sheet bars	39 00
Forging billets	48 50
Wire rods	48 00

NAILS AND SPIKES

Wire nails, base	$4 55
Cut nails, base	5 10
Miscellaneous wire nails	50%

ROPE AND PACKING

Plumbers' oakum, per lb.	0 10¼
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 26
British Manila rope	0 20
New Zealand hemp	0 20

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	Net

MISCELLANEOUS

Solder, strictly	$ 0 25
Solder, guaranteed	0 27
Soldering coppers, lb.	0 62½
White lead, pure, cwt.	17 00
Red dry lead, 100-lb. kegs, per cwt.	13 00
Linseed oil, boiled, single bbls.	1 03
Wood alcohol, per gal.	2 75
Whiting, plain, per 100 lbs.	3 00

CARBON DRILLS AND REAMERS

S.S. drills, wire size	40 and 5
Can. carbon cutters, plus	10
Standard drills, all sizes	40 and 5
3-fluted drills, plus	10
Jobbers' and letter sizes	40 and 5
Bit stock	**50**
Ratchet drills	10
Pure turp., single bbls., gal.	1 20
Linseed oil, raw, single bbls.	1 00
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	25 off
Drills and countersinks	Net
Bridge reamers, carbon	50
Centre reamers	5
Gasoline, per gal., bulk	0 42
Chucking reamers	Net
Hand reamers	10
High speed drills, list net to plus	20
Can. high speed cutters, net to plus	10
American	plus 40

COLD ROLLED STEEL

[At Warehouse]

Rounds and squares	$7.00 base
Hexagons and flats	7.00 base

IRON PIPE FITTINGS

	Black	Galv.
Class A	60	75
Class B	26	36
Class C	17	26

Cast iron fittings, 5%; malleable bushings, 22½%; cast bushings, 22½%; unions, 37½%; plugs, 20% off list.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 00	$ 6 50
Sheets, blue ann., No. 10	5 25	5 50
Canada plates, dull, 52 sheets	7 50	13 00
Can. plates, all bright	14 00	.....
Apollo brand, 10¾ oz., galvanized	....	.....
Queen's Head, 28 B.W.G.	10 75	.....
Fleur-de-Lis, 28 B.W.G.	10 00	.....
Gorbal's Best, No. 28	....	.....
Colborne Crown, No. 28.	....	.....
Premier, No. 28, U.S.	8 25	8 50
Premier, 10¾-oz.	8 25	8 90
Zinc sheets	13 00	15 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13; 5-16, $11; ⅜ in., $10; 7-16 in., $9.80; ½ in., $9.75; ⅞ in., $9.20; ¾ in., $9.30; ⅝ in., $9.50; 1 in., $9.10; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $13; 5-16 in., $11; ⅜ in., $10; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.50; ¾ in., $9.30.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClennand, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES

Size	Seamless	Lapweld
1 in.	$26 00	$.....
1¼ in.	27 25	.....
1½ in.	26 25	29 50
1¾ in.	29 75	27 00
2 in.	29 25	24 50
2¼ in.	33 00	28 50
2½ in.	44 75	32 50
3 in.	49 25	40 00
3¼ in.	.....	48 50
3½ in.	63 50	43 50
4 in.	85 00	55 50

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS

Castor oil, per lb.	—
Royalite, per gal., bulk	28
Palacine	.31
Machine oil, per gal.	58
Black oil, per gal.	27
Cylinder oil, Capital	1.01
Petroleum fuel oil, bbls., net	11.2

BELTING—No. 1 OAK TANNED

Extra heavy, single and double	15%
Standard	15 and 10%
Cut leather lacing, No. 1	2 00
Leather in side	2 40 3 00

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	$4 50
Polishing wheels, bull-neck	2 00
Emery in kegs. Turkish	8¾
Pumice, ground	06
Emery glue	30
Tripoli composition	9½
Crocus composition	12
Emery composition	11
Rouge, silver	64
Rouge, powder, nickel	38

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	8½
Grits, 80 and finer	6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	30
Brass sheets, 24 gauge and heavier, base	38
Brass tubing, seamless	42
Copper tubing, seamless	44

WASTE

XXX Extra	21	Atlas	19
Peerless	22	X Empire	15
Grand	21½	Ideal	18
Superior	21½	X Press	13½
X L C R	16½		

Colored

Lion	13½	Popular	10½
Standard	12	Keen	9
No. 1	14		

Wool Packing

Arrow	35	Anvil	22
Axle	28	Anchor	17

Washed Wipers

Select White	17	Dark colored	13
Mixed colored	14		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ....10% Best grades..15%

ANODES

Nickel	.55 to .60
Copper	.38 to .40
Tin	.70 to .70
Zinc	.16 to .17

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$30 00	$34 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	32 00	38 00
Copper sheet, tinned, 14 x 60, 14 oz.	38 00	42 00
Copper sheet, planished, 16 oz. base	44 00	48 00
Braziers', in sheets, 6 x 4 base	36 00	41 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$ 9 50	$14 50
Sheets, 3½ lbs. sq. ft.	9 25	14 00
Sheets, 4 to 6 lbs. sq. ft.	9 00	13 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

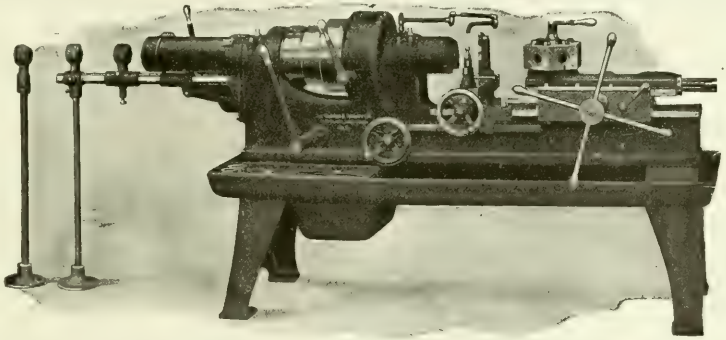
Acid, boracic	$ .25
Acid, hydrochloric	.03¾
Acid, nitric	.10¼
Acid, sulphuric	.03¾
Ammonia, aqua	.20
Ammonium, carbonate	.23
Ammonium, chloride	.22
Ammonium, hydrosulphuret	.75
Ammonium sulphate	.30
Arsenic, white	.18
Copper, carbonate, annhy.	.35
Copper, sulphate	.10
Cobalt, sulphate	.20
Iron perchloride	.62
Lead acetate	.30
Nickel ammonium sulphate	16½
Nickel carbonate	.30
Nickel sulphate	.17½
Potassium sulphide (substitute)	.40
Silver Chloride (per oz.)	1.15
Silver nitrate (per oz.)	1.10
Sodium bisulphate	.13
Sodium carbonate crystals	.04
Sodium cyanide, 127-130%	.39
Sodium hyposulphite per 100 lb.	6.50
Sodium phosphate	.15
Tin chloride	.80
Zinc chloride, C.P.	.30
Zinc sulphate	.08

Prices per lb. unless otherwise stated

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

If It's Machinery—Write "Williams"

64 Front Street West
TORONTO

Scrap Metal

There is little change in the general situation on the scrap market at Pittsburgh. Some of the steel companies would buy heavy melting steel for throwing down in their yards, if they could buy it around $13 to $13.50, but so far as can be learned they have not secured much tonnage at these prices.

On the Chicago market dealers continue to purchase railroad material to stock in their yards against an expected advance. Heavy melting steel is being quoted at $11.50 to $12.

There is little change in the New York scrap metal market. Twelve dollars, delivered eastern Pennsylvania, is the highest price offered by brokers for heavy melting steel.

At Buffalo the only activity in scrap is in heavy melting steel. The manufacturers of railroad equipment, who have purchased about 10,000 tons at $13 within a month, will buy more at $13. These purchases have not been made because of any rush of orders, but because the market in this particular material is thought to have reached the lowest ebb.

Sales of machinery cast at Boston are limited to an occasional car lot, usually in the neighborhood of $18.50 to $19 delivered, which brings the local yards price down to about $16 to $18 per gross ton. Almost no mill orders for material are in this market. The general tendency of the market is downward, due to the lack of consumption.

The improved tone of the market at Cleveland continues, but there is little activity. A Cleveland mill which has recently been a buyer of borings and turnings purchased 4,000 tons of additional during the week at $8.50 to $8.75.

Pig Iron Market

Pittsburgh reports that most grades have declined 50 cents per ton, and Bessemer can be bought a full dollar a ton below the recent nominal quotation. A Valley steel maker secured 2,000 tons of basic pig iron from another steel maker at $22 Valley furnace, and this price can be repeated not only from steel companies, but from merchant producers. One thousand to 1,200 tons of Southern foundry iron was closed for by the Standard Sanitary Manufacturing Company, for its Louisville, Ky., plant for May delivery at $22, Birmingham, for No. 2, a drop of $1 a ton from the former price. The average prices for basic and Bessemer iron from Valley furnaces for April as compiled by one company shows $22.50 for the former and $25 for the latter, against $24.50 and $26.20 respectively in March.

The sales of pig iron on the Chicago market have been very limited during the past week, with Northern material on a $23 furnace base, for No. 2 foundry, malleable and basic. Five hundred tons of malleable was bought by a melter engaged in automobile work, at that price, and a sale of 125 tons of malleable has been made on the same terms.

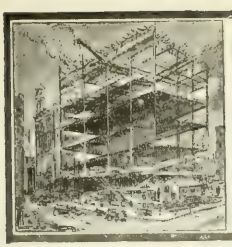
A strike of iron molders in New Jersey foundries which was declared a number of weeks ago is still on, but foundries are able to make all the castings for which they have orders.

A number of sales have been made during the week on the Cincinnati market, but as a general thing the market is very quiet. A central Ohio melter bought 1,000 tons of malleable at a price said to be $21.50 lake furnace, and an order for 200 tons of malleable at $25 was booked by a southern Ohio furnace.

There has been no noticeable change in the Buffalo market during the week, and last week's business was trivial. A better movement on old contracts is reported. There is evidence that a number of foundries are disposing of resale iron. Disposition to order for future delivery is more apparent.

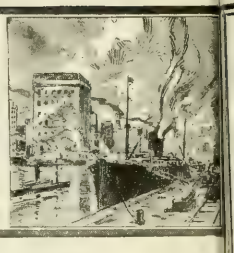
Less than 500 tons of iron were sold on the Boston market in the past week. A wage settlement with Greater Boston molders is expected this week, possibly on a $6 per day basis as against $7.20 at present.

On the Cleveland market consumers are buying only for their immediate requirements, mostly in small lots, and for early shipment.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



RECOVERING FROM POST-WAR SHOCK

British Manufacturer in Canada — Has Faith in Works Council to Cut Down Trouble

That the sane element in British labor was certain to win out in the end, and that British manufacturers would be well able to hold their own in world commerce, seems to sum up the opinions of S. W. Amphlet, proprietor of the Payne & Griffiths Co., of Birmingham. Mr. Amphlet is making a trip across the Dominion, and appointing agents at various points to handle his products, pressure gauges being the leading line.

"There are scores of plants in Britain," stated Mr. Amphlet, "that learned a lot during the course of the war in matters of production. I know how it was in our own business. We brought out methods of turning out certain parts at one-quarter of the cost we had ever thought possible. Not only so, but we increased our capacity a great deal, as many other plants did. There was such a tremendous demand that there was no other way to cope with it. Well, with the cessation of the war, and the end of the boom that followed, all that business was cut off almost over-night, and there we were, with a very large capacity, and with a comparatively small amount of business.

"Our big problem now is to get our costs down to meet the new conditions, and we are having very fair success with that. The British manufacturer, as you know, is interested in the markets of the world, as the home market is not large enough to keep him going. That is why I am in Canada now."

Mr. Amphlet is interested also in the study of methods to bring about a good working condition in the plant, and to increase the feeling of co-operation between the shop and office. He has had a works council in his plant, it being in operation before the much talked-of Whitley plan was ever brought out. "We have a meeting each Monday," said Mr. Amphlet, explaining his plan, "and to that meeting the superintendents, foremen and assistants are called. They know they are just as free to criticize me and the methods in the office as we are to discuss what is being done in the plant, and matters of wages and working conditions and methods are all brought up there. I believe it helps to bring out the best there is in the men. Not long ago I received a most interesting report covering suggestions for changes in our office from one of the superintendents in the plant, and I know for certain that when I am away on this trip the men at the head of departments are doing their best to keep thei ends up."

Mr. Amphlet landed at Montrea called at Toronto, Winnipeg, Calgar and Vancouver on the way west, an when coming back paid a return trip t most of these centres. He was fortunat in establishing very satisfactory sellin connections in these places.

Trade Gossip

Wants a Lathe.—W. A. Aubury, Avonmore, Ont., states that he wants to secure a used 16-inch screw cutting lathe.

Wants Buzz Planer. — Edward T. Smith, Anagance, Kings county, N.B., wants to purchase a small buzz planer about eight- or ten-inch head, suitable for planing hardwood or rough lumber.

Wants Generator—G. L. Whidden, Lower Wentworth, Nova Scotia, is looking for a good, used, direct current generator, 30 to 40, on 110 volt, capable of giving from 600 to 750 amp. He would like to secure this complete with switchboard. He is also interested in a used lighting plant, with or without batteries.

To Make Machine.—Canadian Machinery has a request from a New York company as follows: "We wish to get in touch with some machine shop in Canada with whom we can correspond in regard to making a special machine for us. This arrangement is in order to comply with Canadian patent laws."

Wants Feed Pump.—Vineland Canneries, Ltd., of Vineland Station, Ont., want to secure the following equipment. They would consider used, if in first-class shape:—Duplex boiler feed pump for two 125 h.p. boilers, 2 in. intake and 1½ in. discharge. Along with this is required a number of tees, nipples, check valves, etc. W. A. Whitney is the manager of the concern.

Buy Locomotives.—The T. & N. O. Railway has placed orders for ten locomotives, costing $750,000. They are all equipped with the auxiliary booster engine.

Short of Locomotives.—The Wabash-Grand Trunk at St. Thomas are short of locomotive engines. The freight traffic is so heavy that the road is unable to cope with their present hauling equipment. Seven new engines have been o dered to help out the rush, and ne crews will have to be engaged as so as the locomotives arrive.

Have Bought Equipment.—Edmont city council has decided to purchase 5,000 k.w. Canadian General Electr Company's turbine, with Wheeler co densor, for use at the power plant. Th price of the turbine and condensor wi be $171,000, but the total amount i volved, including installation, new draft ash handling plant, and other improv ments and accessories, will come out a about $250,000. An order for the un has been given and delivery guarantee not later than three months. Accordin to the statements of the firm's represe tative, the unit should be ready by Oct ber.

A New Process.—James W. Moffat M.E.I.C., 366 Sackville St., Toront claims to have perfected a method making steel from ore without the inte mediary of the blast furnace. M Moffatt states that he uses an electr furnace to make the steel, and as far a he has been able to calculate the proce is much cheaper than by the open heart method. The process has been patente in Canada, the United States and othe countries. It is hoped by this metho that iron ore in Canada and Ontario ca be utilized to advantage in the making o steel instead of importing the ore fro other countries.

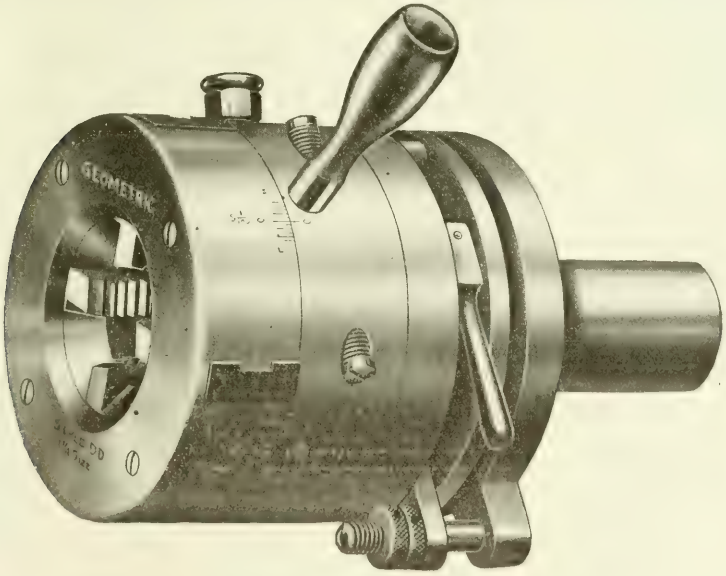
Company Is Busy.—The Des Moine Steel Co., of Chatham, are adding thirt men to their work staff, which has ha a very beneficial effect upon the loca labor situation. Preference will be give to the men who are at present out o employment. The addition was mad necessary through the receiving of rus orders, which require early shipment It is expected the factory will continu to employ large numbers of men throug out the summer months.

After Ten Years' Test
He Finds the Geometrics of Greatest Merit

Right on the Lead

The Superintendent of a Trade School says he has used Geometric Die Heads for the past ten years and finds them superior to any other make.

The Geometric Tool Company for twenty-five years has specialized in Screw Cutting Tools that combine closest accuracy with greatest production.



Geometric Style DD Die Head for Hand Operated Turrets

In perfecting a Die Head for certain Automatic Screw Machines, features were developed that made the Die Head quite as desirable for hand-operated turrets. Compensating spring mechanism overcomes any inaccuracy of adjustment of the turret. Chasers compensate automatically for any slight irregularities that may exist.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Machinery Co., Ltd., Toronto, St. John, N.B., Halifax, N.S.

If interested tear out this page and place with letters to be answered.

Trade Gossip

Wants Equipment.—A. Maurice, Box 241, Sturgeon Falls, Ont., wants to purchase a small cupola, a blower and other equipment.

The Ontario Legislature has authorized the raising of $1,400,000 to be spent on housing and $1,000,000 on buildings.

The National Shipbuilding Company at Goderich will rebuild factory at an estimated cost of $100,000. W. Hutchinson is manager.

A factory costing $15,000 will be erected by the Dominion Motor Castings, Ltd., Hanna and McDougall Avenues, Windsor, Ont.

S. S. Magoffin, contractor, will call tenders shortly for a warehouse in connection with the ocean dock his firm is now building at Vancouver.

Plans are being prepared by Brodeur and Pilon, architects, 63 Hotel de Ville, Hull, Que., for a factory to cost $15,000 for the Ottawa By-Products Co., Montclair St.

The boiler shops of the National Shipbuilding Co., Maitland St., Goderich, Ont., were completely destroyed by fire. The loss is estimated at $100,000 with $75,000 insurance.

Building Products and Fuel Co., Saskatoon, Sask., are erecting a warehouse costing $5,000. The general contract has been awarded to W. J. Gordon, 503 Fifth Ave.

The Imperial Oil, Ltd., 56 Church St., Toronto, will erect a service station at Notre Dame and Marguerite Sts., Montreal. They are also contemplating the erection of a station at Royal and Sherbrooke Sts.

Traversy, Ltd., 136 Papineau Ave., Montreal, has received the general contract for repairs to warehouse and offices costing $40,000 for Canadian Rubber, Ltd., 201 Inspector St.

The Prairie Cold Storage Co. have announced that it has been decided definitely that they will erect a $500,000 building on Bell Ave., just off Main St., Winnipeg. The plans are being prepared by Pratt and Ross, architects. It is expected that work will begin in July and be completed by the end of the year.

Canadian Members. — The following, who are connected with iron and steel operations in the United States and Canada, were elected to membership in the Iron and Steel Institute at the annual meeting in London last week: Robert Montgomery Bird, metallurgist, Bethlehem, Pa.; Hermann A. Brassert, consulting engineer, Chicago; Robert Hobson, president Steel Co. of Canada, Hamilton, Ont.; J. D. Jones, general manager Algoma Steel Corporation, Sault Ste. Marie, Ontario; George V. Luerssen, metallurgist, Carpenter Steel Co., Reading, Pa.; H. A. Morin, general manager Nicu Steel Corporation, Ltd., Welland, Ontario; Roy M. Wolvin, president Dominion Steel Corporation, Montreal.

Making Machinery.—President James Whalen, of the Port Arthur Shipbuilding Co., in the annual statement of the company, said:—"In view of the present situation in regard to vessel construction, your directors have deemed it advisable to authorize the company to enter upon other work than shipbuilding, to which your plant is adaptable. Work has already been commenced upon a contract for twenty compressed air mine shovels for one company, and negotiations with other companies requiring this class of machine have advanced to a point where other contracts seem assured. The undertaking of other suitable work, including the manufacture of pulp machinery and digesters is also contemplated." Since the annual meeting the company has gone ahead with plans along these lines, and has made very satisfactory progress. It has secured the right to build for Canada several special machines that had formerly to be imported from the United States. Prominent specialists in this form of manufacture have also been engaged, and the location of the company, the centre of a large and somewhat isolated area of raw materials, gives importance to its future in the new field.

WIRELESS PLANT

Belgium contemplates construction of a new wireless plant which will be among the most powerful in the world and capable of communicating with North America during the whole of the twenty-four hours, with the Argentine republic during twelve hours, but only eight hours daily with the Congo, owing to the unfavorable atmospheric conditions which obtain in the equatorial regions. The estimated number of words to be transmitted per month, says Engineering, is 1,800,000, or a daily average of 60,000, divided as follows: 35,000 to the States, 10,000 to South America and 15,000 to the Congo. The station will have a capacity of 750 to 1,000 kilowatts.

THREAD-CUTTING TOOLS

Messrs. A. A. Jones and Shipman, Ltd., New Century Works, Leicester, are introducing a series of internal thread-cutting tools, the basic idea of which is a series of cutters which attach firmly to the end of a bar of the boring-bar type. This is carried in an American or English holder, and can be used for cutting threads in any size hole down to ⅜ inch, and at practically any required depth. Three sizes of bars are supplied, the smallest, A, for holes down to ⅜-inch diameter; next, B, for holes 1-inch diameter and upwards; and C, for holes 1¾-inch diameter and upwards. Series of cutters for every standard thread, fitting on to the bar, are available, so that a complete system for internal thread-cutting on the most economical basis is available. The cutters are of the best steel, and being ground radially they are said to retain their form until completely worn out.

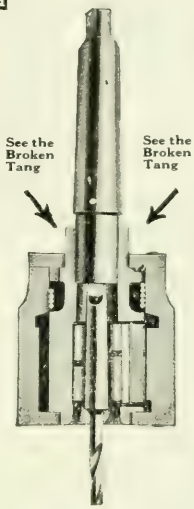
PLAN ON WHICH STANDARD OIL CO. DEALS WITH ITS EMPLOYEES

THE attitude of the Standard Oil Co. toward its employees is set forth briefly in the following summary:

1. No discrimination by the company or its employees against any employee on account of membership or non-membership in any church, society, fraternity or union.
2. Collective bargaining as to all matters of mutual interest made effective through the industrial representation plan.
3. Paying at least the prevailing scale of wages for similar work in the community.
4. The eight-hour day or its equivalent.
5. One day's rest in seven, preferably on Sunday, or the equivalent of such period.
6. Sanitary and up-to-date working conditions.
7. Just treatment assured each employee, with opportunity for submission of all grievances for adjustment through the industrial representation plan.
8. Continuous effort to eliminate accidents through effective safeguards and active co-operation of employees and committees under expert supervision.
9. Payment of disability benefits in case of accidents incurred while at work.
10. Health supervision by a competent medical staff.
11. Payment of sickness benefits after one year's service.
12. Opportunity for special training to qualify employee for better work, with standard system of keeping record of service performed.
13. Promotion according to length of service and ability demonstrated.
14. Partnership through stock ownership made easily possible for the thrifty employee after one year's service, the company adding 50 per cent. to the amount invested by the employee.
15. Assurance of a generous annuity at the age of 65, guaranteed for life after 20 years of service, with special consideration for those who become disabled before that period.
16. Death benefits to insurance providing $500 to $2,000 for dependents of employees of one year or more of service.

Aikenhead's

The Wahlstrom Automatic Drill Chuck



With a Wahlstrom your operator can drill any number of holes of different diameter, one after the other, simply by grasping the chuck with one hand and replacing the loosened drill with another—and two seconds does it. It is not even necessary to stop the spinals.

This Wahlstrom Automatic self-centres the tool perfectly, and its instant-acting jaws close on the entire shank in a grip that becomes firmer as the resistance to the tool increases. The clutch can't slip and the jaws never mark a tool.

Made in two styles. One holds Nos. 1, 2 or 3 Horse Taper Shank Tools—with or without tang. The other is made in three sizes: 15-64 to 1-2 in.; 3-8 to 3-4 in. and 17-32 to 1 in., thus holding all sizes to straight shank tools from 15-64 to 1 in. Booklet upon request.

Simplex 2-Speed Hoist

A Handy, Reliable Time-Saver

Use a "Simplex" for moving your heavy castings and machines. It handles the largest loads with speed and dispatch, and greatly reduces the labor costs for fitting and erection.

The "Simplex" operates at two speeds. Small loads are lifted at twice the speed of large loads. The chains are properly guided so as to eliminate any tendency to jump the sprocket or stick in the guides.

Made in twelve sizes. Blocks with capacities up to 1,600 lbs. handled by one man. With blocks of capacities up to 40,000 lbs., two men can lift full load.

Order a hoist for trial; if it doesn't save you a worth-while amount of time and money, send it back. Literature upon request.

Aikenhead Hardware, Limited

17 Temperance Street, Toronto, Ont.

If interested tear out this page and place with letters to be answered.

A Drinking Water Service that will last a LIFETIME

What you pay for a few ordinary drinking cups will meet the cost of the

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)

DRINKING CUPS ARE UNSANITARY but the "Puro" delivers clean, fresh water at a reduction of 15 per cent. to 57 per cent. in water bill

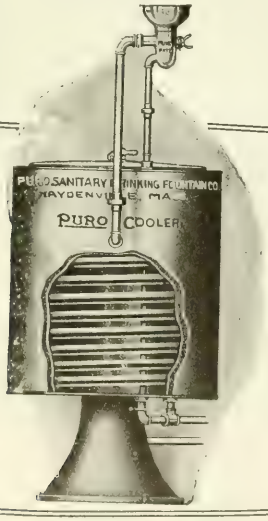
"PURO" WILL SAFEGUARD THE HEALTH OF YOUR EMPLOYEES and protect your staff against disorganization by sickness

Easily attached Simply unscrew the ordinary faucet and put on the "Puro"

Write us to-day for full information regarding the cost of installation of the "PURO" Sanitary Drinking Fountain Service.

Puro Sanitary Drinking Fountain Co.

Canadian Agents:
McKENZIE BROS.
888 F. St. Andre St., Montreal, P.Q., Canada



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Rates (payable in advance): Two cents per word. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

FINDING IT HARD TO GET DOWN TO COMPETITIVE COSTS IN BRITAIN

At a meeting in London of the National Federation of Iron and Steel Manufacturers, Mr. W. T. Layton, a director (who, by the way, is also the representative of the industry on the British Economic Council of the League of Nations), referred at some length to the present economic condition of the industry. He said that an extremely grave condition had arisen, and it had been rendered infinitely worse by the stoppage of the mines. Last year there were in this country some 310 blast furnaces at work. At the end of last month the number had dropped to 125. It had been found that, taking the heavy branches of the iron and steel industry, the value of the product was about £190,000,000. The fuel bill was from £55,000,000 to £60,000,000 for the same branches. Thus 30 per cent. of the total value of the product was represented by fuel. It was obvious they could not hope to carry through an extraordinary liquidation of the industry unless there was a very considerable drop in the fuel bill as well as in other costs. It was not good to imagine that any policy or action of the Government which restricted importation into this country could save the iron and steel industry from facing a great liquidation in its costs. Even if all importations from Belgium, Germany and France stopped, it would not absolve the industry from facing the question of the reduction of costs in the fall of fuel and wages. The problem of getting down to competitive costs was not a hopeless one, and there were factors which did not make the outlook entirely black. If labor could be got to realize that the iron and coal masters were not asking for a reduction in the standard of living for the sake of profits, but under dire necessity of hard economic facts, he hoped to see within a few months a liquidation in the costs of the industry, with renewed production on a more permanent basis.

MONTREAL NOTES

The United Shoe Machinery Company, of Montreal, are expecting to branch out into the construction of special machinery for general manufacturing purposes. They have a splendidly equipped machine shop that will enable them to take care of any work that offers. The falling off in the demand for shoe making equipment has given them the opportunity of utilizing their present facilities for the enlargement of their business.

The Dominion Engineering Works at Lachine are extending their foundry activities to the supplying of grey iron castings of every description for the general requirements of industry. The modern facilities of the plant enable them to fill orders for unlimited sizes of castings, and the machine shop equipment is capable of taking care of any piece of work turned out of the foundry. What will be the largest vertical boring mill in America will shortly be installed at the Rockfield plant.

The annual meeting of the Canadian Railway Club was held last week at the Windsor Hotel in Montreal. Reports of the secretary and treasurer showed that the club had just completed the most successful year in its history. The membership now stands at 1,385, several hundred having been added to the roll during the past season. The officers elected for the ensuing year are: Arthur Crumpton, valuation engineer of the G.T.R., president; G. M. Wilson, superintendent of motive power shops, G.T.R., Montreal, first vice-president; E. E. Lloyd, assistant comptroller of the C.P.R., Montreal, 2nd vice-president. The executive committee consists of the following: E. R. Battley, supt. of motive power eastern lines of the G.T.R.; E. R. Naylor, assistant works manager of the C.P.R. Angus shops; C. E. Brooks, mechanical assistant, motive power, C.N.R., Toronto; R. J. Needham, mechanical and electrical engineer of the G.T.R.; J. A. Shaw, electrical engineer of the C.P.R., Montreal; and W. U. Appleton, general superintendent, C.N.R., Moncton, N.B. The secretary, W. A. Booth, was re-elected, and P. P. Reynolds, chief clerk in the mechanical engineer's office of the C.P.R., was elected to the office of treasurer, superseding E. E. Lloyd. After the election of officers, W. H. Winterrowd, the retiring president, was presented with a president's jewel. Following this, an enjoyable smoking entertainment was held.

Obituary

The death occurred recently in New York of Ambrose Monel, a well-known inventor and financier. He was the first president of the International Nickel Co. At the time of his death he was vice-president of the International Nickel, a director of the International Corporation, of Midvale Steel, of the Liberty National Bank, of the Bankers' Trust Co., International Motors and some other concerns. Some years ago, while with the United States Steel Corporation, he invented the process of treating steel known as the "Monel process."

Personals

Stanley Shupe, of Oshawa, has been appointed as city engineer of Kitchener, Ont., at a salary of $2,500. Mr. Shupe has had considerable engineering experience in Toronto and Oshawa and at one time was employed in Kitchener. At present he is the engineer at Oshawa

Roy M. Wolvin, president of the British Empire Steel Corporation, sailed for England on May 3. It has been stated that while he is in England he will be in almost continuous touch with English interests in order that a great many details relating to the corporation may be settled as speedily as possible.

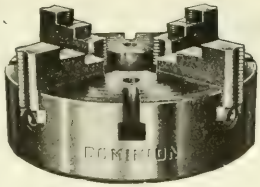
The mariage took place in Galt of Beverley H. Neil, secretary-treasurer of the Canada Machinery Corporation, and Marian Turnbull, daughter of J. T. Turnbull, of the C. Turnbull Knitting Co., Galt. Mr. and Mrs. Neil have been spending their honeymoon in the South and will take up their residence in Galt.

The Toronto branch of the Engineers' Institute of Canada held their annual meeting on April 28, when the following officers were elected: Chairman, George T. Clark; vice-chairman, W. Storey; secretary, F. N. Goldike; executive, Professor P. Gillespie, G. G. Powell, M. V. Saner, Col. H. G. Lamb, J. M. Oxley, R. C. Muir.

Robert J. Black died at his home in St. Catharines. For the last 25 years he, with his sons, had carried on the machine and repair business of the R. J. Black Machine Co. Previous to going into business he was a marine engineer for some 20 years. The late Mr. Black served his time with the C. Yale firm, builders of marine engines. He was well known in the St. Catharines district, and highly respected. His sons, Norman and William, are now carrying on the business.

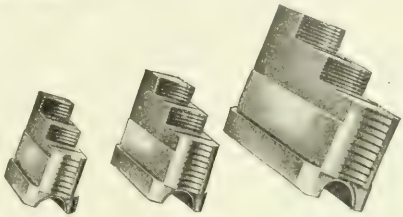
Hugh D. Scully has been appointed general manager of the Preston Car & Coach Co., Ltd., Preston, Ont., and is removing from Toronto to Preston. Following graduation from the University of Toronto, Mr. Scully acted for a time as secretary Toronto Branch, C.M.A. He later served as secretary of the Home Markets Association, organizing the work of that organization. He was at a later date treasurer of the Russell Motor Car. Co. and manager of the Toronto office of the Willys-Overland Co.

E. A. Adams, advertising manager for the Fairbanks-Morse Co., has resigned from that position after some years of capable service. Mr. Adams has been a keen student of merchandising methods, and had a thorough grasp on the field and the best way to reach it. He is now Canadian representative for the Lovejoy Shock Absorber Co. Mr. MacGruder is the successor to Mr. Adams at the advertising department of the Canadian Fairbanks-Morse Co., at the Montreal office.



DOMINION CHUCKS

STEEL OR CAST-IRON BODY
BUILT FOR HEAVY DUTY



The Jaws Are Extra Strong

THEY are drop forgings, made of best quality steel, heat-treated and hardened. The threaded portion of jaws form a half nut for the setting-up screws. Have stood the test of heavy duty work in our own shops where accuracy was the only accepted standard.

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Engineers • Manufacturers
BRANTFORD, CANADA

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The old established firm. Patents everywhere. Head office, Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada. Booklet Free.

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Consulting and Designing
Tools, Jigs, Fixtures and Special Machinery. Let us shoulder your problems.
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Send us your blueprints and specifications. Entrust your requirements to experienced workmen and up-to-date equipment. Have your dies made in Canada. First-class workmanship guaranteed.
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BELTING
138 YORK ST. TORONTO

BLACK DIAMOND OVENS
OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal Keruchen Siphonage Ventilators Bakers' Ovens, trucks, casters, etc. Write for Booklet
Brantford Oven & Rack Co. Ltd
Brantford, Canada

England is now importing heavy quantities of foreign coal. The first order for Canadian coal was placed yesterday for 12,000 tons from Sydney, N.S. There are prospects of further business if the Government can guarantee unloading, as the essential industries must be supplied. The current prices are from 65 to 70 shillings a ton at London. The Government on May 5 stopped the coal supply to breweries.

A fire which broke out late Saturday afternoon, May 8, at Queenston, in the power house of the Queenston-Chippawa development, damaged plant and equipment to the extent of about $50,000. While the actual damage itself seems large, it will not retard the schedule for the completion of the work at all, nor will it cost the Hydro-Electric any money. The origin of the fire has not been determined.

Classified Opportunities

MECHANICS WANTED

WANTED — DRAUGHTSMEN HAVING EXperience on transformers and motors. Apply, stating qualifications and salary expected, to Canadian Crocker-Wheeler Co., Ltd., St. Catharines, Ont. (cfm)

WANTED — EXPERIENCED OPERATOR FOR Brown hoist locomotive crane. York Sand & Gravel, Gerrard and Victoria Park Ave., Toronto. (cfm)

WANTED—FIRST-CLASS ENGRAVER—STEEL die and copper plate; send samples. Stovel Company, Ltd., Winnipeg. (cfm)

WANTED—TWO LATHE HANDS AND ONE general machinist; single men preferred. Apply by mail only, giving references and wages expected. Barnard Machinery Company, Brighton, Ont. (cfm)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (etfm)

MACHINE WORK WANTED

We are equipped to handle all kinds of general or special machine work. All operations in our plant are done under the most careful supervision and we can satisfy you as to price. Always available for consultation.

PERFECT MACHINE COMPANY, GALT

Builders of Reliable Machinery.

Modern Marine Machinery

Automatic Steam Towing Machines, Ship Windlasses, Cargo and Deck Winches, Steam Capstans, Dock Gypsies, Steering Engines, Hydraulic Freight Hoists, etc. Grey Iron and Brass Castings. Special machinery built to order. The Corbet Foundry & Machine Co., Limited, Owen Sound, Ont. (52)

SUNCLO BRAND

WIPING CLOTHS
COTTON WASTE
WOOL WASTE

Prepared By

THE LEVI'S
98 John Street
TORONTO, ONT.

Prices on application

3-PHASE, 25-CYCLE, 550 VOLT.

3 25 H.P. CROCKER-WHEELER MOTORS, 750 r.p.m.
3 30 H.P. WESTINGHOUSE MOTORS, 750 r.p.m.
1 32 H.P. LANCASHIRE MOTOR, 750 R.P.M.
2 35 H.P. CROCKER-WHEELER MOTORS, 750 r.p.m.
1 40 H.P. WESTINGHOUSE MOTOR, 750 R.P.M.
1 40 H.P. CANADIAN GENERAL MOTOR, 750 r.p.m.
14 50 H.P. WESTINGHOUSE MOTORS, 750 r.p.m.
5 50 H.P. CROCKER-WHEELER MOTORS, 750 r.p.m.
5 75 H.P. CROCKER-WHEELER MOTORS, 750 r.p.m.
3 100 H.P. WESTINGHOUSE MOTORS, 480 r.p.m.

3-PHASE, 25-CYCLE, 2200 VOLT.

2 250 H.P. WESTINGHOUSE MOTORS, 750 r.p.m.

Box 779G, Canadian Machinery.

CLOSING TIME

Condensed advertisements for this section must be in our composing room Tuesday morning prior to day of issue. Display advertisements for this section must be in Monday afternoon.

In order that the announcements of your wants, machinery for sale, etc., etc., shall not be delayed, please try to have them in our office with the Tuesday morning mail.

Canadian Machinery

Phone Park. 3550

A. AUSTIN

GENERAL MACHINE WORK

Turret Lathe and Automatic Screw Machine a Specialty. Let us quote on your work.

With: Garlock, Walker Machinery Co. 163 Dufferin Street.

Grey Iron Castings

Light and Medium-Bench and Floor Repetition Castings; Capacity 15 tons per day.
Expert Metal and Wood Pattern Work. Our advice and estimates will save you money.
Semi-finishing operations on Lathe or Grill on Castings supplied if required.
ASK US.

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Oxygen, Acetylene, and a complete line of Welding and Cutting Supplies.

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of Toronto, Limited
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(TF)

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TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (ctfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

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WANTED—BY AN ESTABLISHED CONCERN. Twelve to fifteen thousand dollars for a period of from one to three years, to take care of business expansion. This concern will stand the fullest investigation. 8% is offered with ample security to principals only, with an opportunity of becoming permanent associates with the partners, if mutually satisfied. Box 767, Canadian Machinery. (etfm)

FOR SALE

ELECTRIC STORAGE BATTERY LOCOMOtives for sale. Two. 36-inch gauge. Complete and in good condition. R. T. Gilman & Company, Dept. "E," 211 McGill Street, Montreal. (ctfm)

Used Machinery For Sale

1 No. 3 Greenard Arbor Press and Stand
1—Small Drill Grinder
1—No 190 Wells Tool and Cutter Grinder
1—8" Heald Rotary Surface Grinder
1—No. 70 Heald Internal Grinder
1—18" x 8' Mueller Lathe
1—Belt Driven Oil Separator

CHARLES P. ARCHIBALD & CO.,
285 Beaver Hall Hill - - MONTREAL

Machine Shop and Foundry for sale. St. Catharines, Ont. In the centre of the Welland Ship Canal and Hydro activities. Going concern capable of handling all classes of work. Turnover $60,000 a year. Good reasons for selling. Box 777, Canadian Machinery. (c5m)

MACHINERY FOR SALE

1—24" x 12' Canadian Machinery Lathe
2—22' x 10' Davies Lathes.
1—21" x 10' London Lathe.
6—20" x 8' C.M.C. Lathes.
1—18" x 8' Mueller Lathe.
3—19" x 8' C.M.C. Lathes.
1—18" x 8' London Lathe.
1—16" x 8' C.M.C. Lathe.
1—16" x 6' McDougall Lathe.
1—D-1 H. D. Colburn Drill.
2—No. 24 H. D. Foote-Burt Drills.
1—28" B. G. Barnes Drill.
1—22" B. G. Barnes Drill.
1—D.C. Compound Wound Generator, 110 Valts, 125 Amp.
2—No. 54 Perkins Sprue Cutters.
2—2" x 26" Pratt & Whitney Turrets.
1—10" x 52" Plain Landis Grinder.

Write us for particulars and prices.

Box 751 F.
Canadian Machinery

Classified Opportunities

A Sacrifice

6 ft. used Bertram Plain Radial Drill with Speed Box.

42 x 36 x 14 ft. used Bertram Planer arranged for Motor Drive.

24 x 14 x 20 ft. C.M.C. used Gap Lathe.

Machines in first-class condition, at greatly reduced prices, subject to prior sale.

Williams & Wilson Ltd.
84 Inspector Street
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STOP

I am offering this exceptional selection of high-grade re-built tools at special prices. They are all equal to new machines and are priced low enough to warrant your sending me your inquiries for any of them that you are in the market for at the present time or expect to be.

26 x 12 C.M.C., 3-step cone, D.B.G., Q.C.G.
24 x 12 Rahn Larmon, 3-step cone, S.B.G., S.Q.C.
22 x 10 Devenport, 3-step cone, D.B.G., Q.C.G.
22 x 10 Reed, 3-step cone, S.B.G., S.Q.C.
22 x 10 Hamilton, 3-step cone, D.B.G., S.Q.C.
22 x 10 Milwaukee, 3-step cone, D.B.G., S.Q.C.
21 x 10 Sidney, 3-step cone, D.B.G., Q.C.G.
21 x 8 LeBlond, 3-step cone, D.B.G., Q.C.G.
20 x 10 Walcott, 3-step cone, D.B.G., Q.C.G.
16 x 10 Greaves Klausman, 3-step cone, D.B.G., Q.C.G.
18 x 8 Mueller, 3-step cone, D.B.G., Q.C.G.
17 x 8 Sidney, 3-step cone, D.B.G., Q.C.G.
No. 2 Garvin Milling Machine, complete.
No. 4 Greenard Arbor Press.
24" Cincinnati Shaper.
16" Walcott, back geared, complete.

The above is only a partial list, let me have your inquiries. Anything not listed ask for it. I have it.

I am offering a full line of British make new milling machines, plain and universal. They are equal to number two's and are complete with dividing heads, vertical attachments and pump. Let me tell you about them because you cannot beat them at the price.

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You will find Garlock-Walker service thoroughly dependable. Let us know what Machinery you require.

If you want Machinery Equipment, send us your enquiries.

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1—144" x 12' Berg Pit Lathe (used).
1—36" x 18' Putnam (used).
1—30" x 12' Blaisdell (used).
1 30" x 14' Niles-Bement-Pond (used).
1 28" x 14' Niles-Bement-Pond (used).
1 24" x 10' Milwaukee (new).
1 20" x 6' Le Blond Heavy Production (used).
1 18" x 8' Bertram (rebuilt).
1 18" x 8' Rae (new).
1—16" x 6' Reed (used).
1 12" x 8' LeBlond (used).
1 8" Rivett, Bench, Cabinet and Attachments (used).
1 7" Cataract Precision, Standard Equipment.

GAP LATHES

1 22" x 20' x 16' McDougall (used).
1 20" x 8' x 12' C. M. C. (used).
1—18" x 24" x 10' Rahn Meyer (used).

TURRET LATHES & SCREW MACHINES

Several No. 4 Millhollands, Davis, Oliver, Garvin, Warner & Swasey, and National Acme.

SHAPERS

1 16" Rae B. G. Crank Shaper (new).
1 24" McGregor-Gourlay Crank Shaper (used).

PLANERS

1—42" x 42" x 20' Putnam, 1 Head (used).
1 18" x 18" x 14' Patch, 4 Heads.
1—36" x 36" x 24' Sellers, Open Side (3 Heads).
1 30" x 30" x 10' Pond, 1 Head.

MILLING MACHINES

1—Briggs High Duty Type "A", 22" Traverse (new).
1 Briggs High Duty Type "B" 42" Traverse (new).
1—Ryerson-Owen No. 3, Universal (new).
1 Ford-Smith, No. 3 Universal (used).
Several Plain and Small Hand Millers.

DRILLS

1 10" Burke Sensitive Bench (new).
1—15" Rockford (used).
1 16" No. 2B Edlund H. S. Sensitive (new).
20" "Sibley," "Champions," "Rockwell" and "Silver" (new and used).

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1—Universal No. 2½ Horizontal, Table 42" x 22" (used).
1—Bullard "New Era" Type Vertical Turret, 36", Complete Equipment (new).

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1 No. 10 Racine 8" x 8" Cap. (new).
1 No. 7 Watkins, 9" Cap. (used).
1 No. 1 Racine, 6" x 6" Cap. (used).

GRINDING MACHINES

1—Landis No. 4 Universal (used).
1—Landis Plain, self-contained, 36" x 12" (used).
1 Fitchburg Cylindrical, 8" x 36" (new).
Tool and Cutter Grinders. New and used. "Globe," Stevens, LeBlond and Cincinnati.

AIR COMPRESSORS

1—8" x 8" Sullivan, Class W.G.-3, belt driven (used).
1 8" x 10" x 8" Bury, steam driven (used).
1—12" x 18" Ingersoll-Sargent, belt drive (used).
1—12" x 12" Can. Ingersoll-Rand, N.-E.-1 (used).

PRESSES

1 No. 0 Consolidated Inclinable Power Press (used).

MISCELLANEOUS

2—No. 4 Jno. Hall Pipe Machines (1 used, 1 new).
1—No. 4 Jno. Hall Nipple Machine (used).
1 Lennox Rotary Bevel Shear, 1" cap. (new).
1—6" Curtis Pipe Machine (used).
1—Beaudry Champion Power Hammer, No. 9 (used).
1 Grant Rivet Spinning Machine, No. 80A (new).
1 Grant Rivet Spinning Machine, No. 80B (used).
1—Greenerd Arbor Press No. 4 (used).
Transmission Equipment, Pulleys, Belting, Shafting and Hangers.

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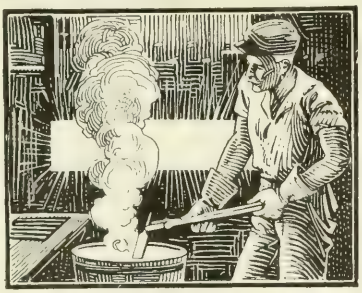

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Practical men are conservative. They stick to the brands they know, and have found satisfactory.

It's easier to give a practical man what he wants, than to sell him something new.

That is why it pays to stock one of these five brands of files, known by practical users as the standard:

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We carry large reserves, so you can restock quickly from your jobber.

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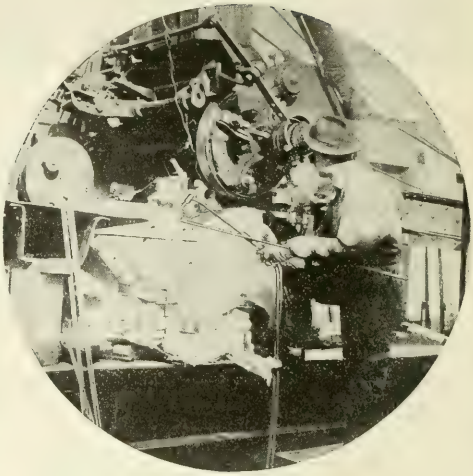

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That's the usual quick way in which it is possible to weld with Prest-O-Lite and the oxy-acetylene process.

Through the use of Prest-O-Lite it is possible to weld, build up and cut metals without bringing the work to be done to a workshop.

Thus Prest-O-Lite, the Universal Gas with the Universal Service provides the means for moving an oxy-acetylene welding outfit anywhere and everywhere.

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PWC-525

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NATIONAL ACME COMPANY
MONTREAL, P.Q.

De Courcelles G.T.R.R.

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ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

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in shop and laboratory use the

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When in need of Circular Metal Cutting Saws, Hack Saw Blades, Hack Saw Frames, Kwik-Kut Power and Metal Cutting Band Saw Machines we will be pleased to have your specifications.

"A BETTER SAW FOR EVERY USE"

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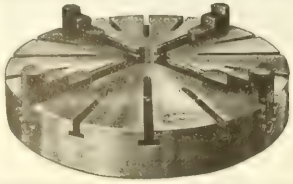

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They represent strength and economy with high-speed cutting tools. Accurate and dependable always.

Our All-Steel Independent Chucks have established records for accurate, long-wearing qualities. We also make Geared Scroll Chucks and the Geared Scroll Combination. Ask for particulars.

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JOHN W. GORDON, Manager
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Also Lathe Chucks and Centering Machines
THE D. E. WHITON MACHINE CO.
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VICTORIA Special Machinery
DESIGNS PATTERNS
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Secure Data and Estimates of "MORSE" DRIVES
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Pumps for any Service—Steam Appliances—Freight Elevators—Webster Vacuum Heating System.

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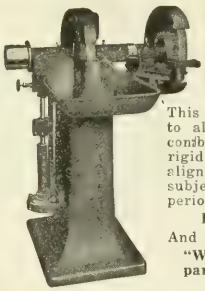

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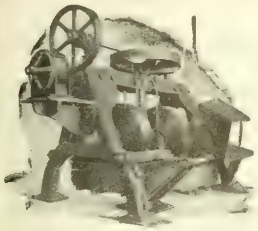

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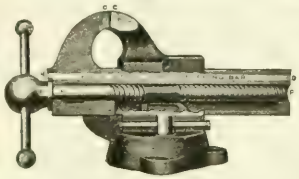

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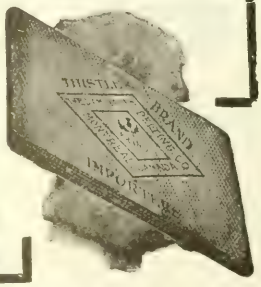

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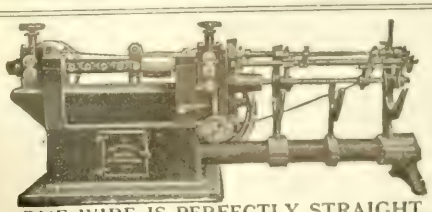

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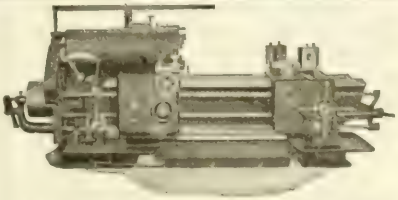

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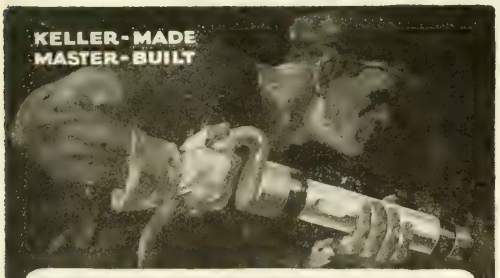

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Norton Co. of Can., Ltd., Hamilton, Ont.
Oakey & Sons, Ltd., John, London, S.E., Eng.
Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont

Acetylene, Dissolved
L'Air Liquide Society, Toronto, Ont.

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Stewart & Co., Duncan, Glasgow, Scot.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Independent Pneumatic Tool, Chicago, Ill.

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Toronto Testing Laboratory, Toronto, Ont.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Columbia Hdwe. Division, Cleveland, O.
Petrie, Ltd., H. W., Toronto, Ont.

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Brown & Sharpe Mfg. Co., Providence, R.I.
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Ford-Smith Machine Co., Hamilton, Ont
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Jacobs Mfg. Co., Hartford, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Skinner Chuck Co., New Britain, Conn.

Axles, Car
Dom. Foundries & Steel, Hamilton, Ont.

Babbitt Metal
Atkins & Co., Inc., E. C., Indianapolis, I.
British Smelting & Refining Co., Ltd., Montreal, Que.
Canada Metal Co., Ltd., Toronto, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hoyt Metal Co., Toronto, Ont.
Magnolia Metal Co., Montreal, Que.

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Canada Foundries & Forgings Co., Welland, Ont.
Canadian SKF Co., Toronto, Ont.
Dominion Foundries & Steel, Ltd., Hamilton, Ont
Pilot Steel & Tool Co., Montreal, Que
Railway Roller Bearing Co., Syracuse, N.Y.

Barrels, Tumbling
McDougall Co., Ltd., R., Galt, Ont.

Bars, Boring
Armstrong Bros. Tool Co., Chicago, Ill.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis
Madison Mfg. Co., Muskegon, Mich.

Bars, Boring, Portable
Underwood Corp., H. B., Philadelphia, Pa.

Bars, Bronze Cored
Moore & Son, Thos., Montreal, Que

Bars, Iron
Steel Co. of Canada, Ltd., Hamilton, Ont.

Bars, Steel
Algoma Steel Corp., Ltd., Sault Ste Marie, Ont.
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada
Canada Foundries & Forgings Co., Welland, Ont.
Can. Steel Foundries, Montreal, Que
Dom. Foundries & Steel, Hamilton, Ont
N. S. Steel Co., Ltd., New Glasgow, N.S.
Ontario Metal Products Co., Ltd., Toronto, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Alloy Steel Corp., Canton, Ohio
Vanadium Alloys Steel, Latrobe, Pa.

Bearings, Ball
Canadian SKF Co., Toronto, Ont
Chapman Double Ball Bearing Co., Toronto, Ont.
Lang Mfg. Co., Guelph, Ont.
Lyman Tube & Supply Co., Montreal, Que
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Railway Roller Bearing Co., Syracuse, N.Y.

Bearings, Bronze
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Bearings, Die-Cast
Fisher Motor Co., Ltd., Orillia, Ont.
Franklin Die-Casting Corp., Syracuse, N.Y.
Tallman Brass & Metal Co., Hamilton, Ont.

Bearings, Journal
Fisher Motor Co., Ltd., Orillia, Ont.

Bearings, Roller
Can. Fairbanks-Morse Co., Ltd., Montreal.
Lang Mfg. Co., Guelph, Ont
Lyman Tube & Supply Co., Montreal, Que.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
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Graton & Knight Mfg. Co., Worcester, Mass.

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Gilmer Belt Lacer Co., Grand Rapids, Mich.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
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Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.

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Flexible Steel Lacing Co., Chicago, Ill.

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Flexible Steel Lacing Co., Chicago, Ill

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Flexible Steel Lacing Co., Chicago, Ill

Belt Lacing Machines
Clipper Belt Lacer Co., Grand Rapids, Mich.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
McLaren Belting Co., J. C., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.

Belt Joiners, Conveyor
Flexible Steel Lacing Co., Chicago, Ill

Belt Tools
Graton & Knight Mfg. Co., Worcester, Mass

Belting, Chain
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que
Lyman Tube & Supply Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Rensselaer (Hans) of Canada, Ltd., Montreal, Que.

Belting, Fabric
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.
Dom. Belting Co., Ltd., Hamilton, Ont
Federal Eng'r'ng Co., Ltd., Toronto, Ont
Fess Machinery & Supply Co., Geo. F., Montreal, Que
McLaren Belting Co., J. C., Montreal, Que
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Belting, Leather
Atkins & Co., Inc., E. C., Indianapolis, I
Can. Fairbanks-Morse Ltd., Montreal, Q.
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que
Smith Belting Co., Toronto, Ont.
Summer & Co., New York City.
Tullis & Son, Ltd., John, Glasgow, Scot.

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Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Gutta Percha & Rubber, Toronto, Ont.
Quaker City Rubber Co., Philadelphia, Pa.

Belts, Abrasive
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Oakey & Sons, Ltd., John, London, S.E., Eng.

Bench Countershaft Standards
Ford-Smith Machine Co., Hamilton, Ont.

Benches, Work
Aikenhead Hardware Ltd., Toronto, Ont.

Bending Machines, Power
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bertrams Ltd., Edinburgh, Scotland.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Williams Machinery Co., A. R., Toronto, Ont.

Bins, Ore
MacKinnon Steel Co., Sherbrooke, Que.

Blocks
Ford Chain Block Co., Philadelphia, Pa.
Wright Mfg. Co., Lisbon, Ohio.

Blocks, Chain (See Hoists, Hand)
Aikenhead Hardware Ltd., Toronto, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block Co., Philadelphia, Pa.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

Blocks, Die
Canada Foundries & Forgings Co., Welland, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Dom. Foundries & Steel, Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Sawtell Crucible Steel Co. of Canada Ltd., Windsor, Ont.

Blocks, Pillow
Can. Link-Belt Co., Toronto, Ont.

Blowers
Can. Blower & Forge Co., Ltd., Kitchener
General Combustion Co. of Can., Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Sheffield Engineering Supplies, Ltd., Montreal, Que
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Sturtevant Co., B. F., Boston, Mass

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Acme Machinery Co., Cleveland, Ohio
Bertram & Son Co., Ltd., The John Dundas, Ont
Garlock-Walker Mchy. Co., Toronto, Ont
Greenfield Tap & Die Corp., Galt, Ont
Landis Machine Co., Inc., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio
Victor Tool Co., Waynesboro, Pa.

Bolt and Nut Machinery, Automatic
National Acme Co., Cleveland, Ohio

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Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
National Acme Co., Cleveland, Ohio
N. S. Steel Co., Ltd., New Glasgow, N.S.
Petrie, Ltd., H. W., Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Jones & Lamson Machine Co., Springfield, Vermont
Landis Machine Co., Inc., Waynesboro, Pa

Boosters
Sturtevant Co., B. F., Boston, Mass

Boring and Turning Mills, Vertical
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.

Boring, Drilling and Milling Machines, Horizontal
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis.
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Landis Tool Co., Waynesboro, Pa.

Boring, Drilling and Milling Mach., Vertical
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
McDougall Co., Ltd., R., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.

Boring Heads
Aikenhead Hardware Ltd., Toronto, Ont.

Boring Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros. Tool Co., Chicago, Ill
Gisholt Machine Co., Madison, Wis.

Brakes, Magnetic (for electric furnaces)
Volta Mfg. Co., Welland, Ont.

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Brown's Copper & Brass Rolling Mills Ltd., Toronto, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Brass Valves
Puro Sanitary Drinking Fountain Co., Haydenville, Mass

Brass Pipe Fittings
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

Bricks, Fire
Elk Firebrick Co. of Can., Ltd., Hamilton, Ont.

Bridges
Hamilton Bridge Works Co., Ltd., Hamilton, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

Broaching Machines
Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mchy. Co., Toronto, Ont.

Bronze
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Bronze, Phosphor
British Smelting & Refining Co., Ltd., Montreal, Que
Canada Metal Co., Ltd., Toronto, Ont
Ontario Metal Products Co., Ltd., Toronto, Ont.

Bucket Carriers, Pivoted
Can. Link-Belt Co., Toronto, Ont

Buffing or Polishing Machines (See Polishing and Buffing Machines)
Blount Co., J. G., Everett, Mass.
Can. Hanson & Van Winkle Co., Ltd., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Petrie, Ltd., H. W., Toronto, Ont.
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Bulldozers
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.

Burners, Oil and Gas
General Combustion Co of Can., Ltd., Montreal, Que.
Hauck Co., W. S., New York City

Bushings
Fisher Motor Co., Ltd., Orillia, Ont
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Cabinets, Oil
Stow, Bowser & Co., Ltd., Toronto, Ont.

Calipers
Brown & Sharpe Mfg. Co., Providence, R.I
Starrett Co., L. S., Athol, Mass

Cams
Canada Foundries & Forgings Co., Welland, Ont.

Can-Making Machinery (See Sheet Metal Working Machinery
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont
MacKinnon Steel Co., Sherbrooke, Que

Union Carbide Co. of Can., Ltd., Welland, Ont.

Cars, Ore
MacKinnon Steel Co., Sherbrooke, Que.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia
Can. Hanson & Van Winkle Co., Toronto, Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Brass and Bronze
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Canada Electric Castings Co., Ltd., Orillia.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Can. Driver-Harris Co., Walkerville, Ont.
Electric Steel & Engineering Co., Welland, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Copper
Can. Hanson & Van Winkle Co., Toronto, Ont.
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Marine
Can. Steel Foundries, Montreal, Que
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Castings, Die Molded
Fisher Motor Co., Ltd., Orillia, Ont.
Franklin Die-Casting Corp., Syracuse, N.Y.
Katie Foundry Co., Galt, Ont.
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Ferro-Alloy
Can. Steel Foundries, Montreal, Que.

Castings, Iron
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Bernard Industrial Co., A., Fortierville, Que.
Bilton Machine Co., Bridgeport, Conn.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Canada Electric Castings Co., Ltd., Orillia.
Hanna & Co., M. A., Cleveland, Ohio.
Hepburn Ltd., John T., Toronto, Ont.
Katie Foundry Co., Galt, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
McDougall Co., Ltd., R., Galt, Ont.
Victoria Foundry Co., Ltd., Ottawa, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Castings, Hyd. Press
Can. Steel Foundries, Montreal, Que.

Castings, Monel Metal
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

Castings, Naval Bronze
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Castings, Nichrome
Can. Driver-Harris Co., Walkerville, Ont.

Castings, Nickel
Can. Hanson & Van Winkle Co., Toronto, Ont.

Castings, Semi-Steel
Davidson Mfg. Co., Thos., Montreal, Que.
Hull Iron & Steel Foundries, Hull, Que.
Katie Foundry Co., Galt, Ont.
Manitoba Steel Foundries, Ltd., Winnipeg, Man.

Castings, Steel
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Can. Steel Foundries, Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Swedish Crucible Steel Co. of Can., Ltd., Windsor, Ont.

Cements, Iron
Smooth Mfg. Co., Jersey City, N.J.

Centering Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.

Chains (See Sprockets and Chains)
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Renold (Hans) of Canada, Ltd., Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

Chains, Driving
Can. Link-Belt Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Renold (Hans) of Canada, Ltd., Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

Chasers
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Chemists
Toronto Testing Laboratory, Toronto, Ont.

Clucking Machines
Acme Machine Tool Co., Cincinnati, Ohio
Brown & Sharpe Mfg. Co., Providence, R.I.

BUYERS' DIRECTORY

Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Chucks, Drill
Jacobs Mfg. Co., Hartford, Conn.

Chucks, Drill and Tap
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Canadian SKF Co., Toronto, Ont.
Cushman Chuck Co., Hartford, Conn.
Dom. Steel Products Co., Brantford, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.
Williams & Wilson, Ltd., Montreal, Que.

Chucks, Lathe
Aikenhead Hardware Ltd., Toronto, Ont.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Dom. Steel Products Co., Brantford, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Geometric Tool Co., New Haven, Conn.
Gisholt Machine Co., Madison, Wis.
Ker & Goodwin Machine Co., Brantford, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.
Williams & Wilson, Ltd., Montreal, Que.

Chucks, Magnetic
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Chucks, Planer
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.

Chucks, Vertical Boring Mill
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Skinner Chuck Co., New Britain, Conn.
Union Mfg. Co., New Britain, Conn.

Clamps, Machinists'
Columbia Hdwe. Division, Cleveland, O.
Dickow, Fred C., Chicago, Ill
Starrett Co., L. S., Athol, Mass.

Cleaners, Metal, Waste, General
Oakley Chemical Co., New York, N.Y.

Clocks, Time
Gisholt Machine Co., Madison, Wis.
International Business Machines Co., Toronto, Ont.

Clutches, Friction
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Positive Clutch & Pulley Works, Toronto, Ont.

Coal and Ash Handling Machinery
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Coal-Storage Systems
Can. Link-Belt Co., Toronto, Ont.

Cocks and Faucets
Pure Sanitary Drinking Fountain Co., Haverhill, Mass

Collars, Shaft or Set
Canada Foundries & Forgings Co., Welland, Ont.
Can. Link-Belt Co., Toronto, Ont.

Collets
Ackworthie, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Canada Machinery Corp., Galt, Ont.
Hender Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Compounds, Carburizing, Case Hardening and Tempering
Cataract Refining Co., Toronto, Ont.

Compounds, Cleaning
Can Hanson & Van Winkle Co., Ltd., Toronto, Ont
Oakley Chemical Co., New York, N.Y.

Compounds, Cutting, Drilling, Grinding, Screw Cutting
Atkins & Co., Inc., E. C., Indianapolis, I.
Cataract Refining Co., Toronto, Ont.
Oakley Chemical Co., New York, N.Y.

Compressors, Air
Curtis Pneumatic Machinery Co., St Louis, Mo

Compressors, Air and Gas
Can. Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Garlock-Walker Mchy Co., Toronto, Ont.

Holden Co., Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.

Cones, Friction
Norton Co. of Can., Ltd., Hamilton, Ont.

Connecting Rods and Straps
Canada Foundries & Forgings Co., Welland, Ont.

Contract Work
Ford-Smith Machine Co., Hamilton, Ont.
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo
Victoria Foundry Co., Ltd., Ottawa, Ont.

Conveyors and Elevators (See Elevators)
Jones & Glassco, Montreal, Que.
Main Belting Co. of Can., Montreal, Que.
Mathews Gravity Carrier Co., Port Hope, Ont.

Conveyor Belt Joiners
Flexible Steel Lacing Co., Chicago, Ill.

Copper
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.

Cored Bronze Bars
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Cotter Pins
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Counterbores
Cleveland Twist Drill Co., Cleveland, O
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Counters, Revolution
Aikenhead Hardware Ltd., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Countershafts
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
McDougall Co., Ltd., R., Galt, Ont.

Countersinks
Butterfield & Co., Inc., Rock Island, Que
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Couplers, Car and Locomotive
Can. Steel Foundries, Montreal, Que
Dominion Foundries & Steel, Ltd., Hamilton, Ont

Couplings, Flexible
Holden Co., Ltd., Montreal, Que.

Couplings, Rigid
Bernard Industrial Co., A., Fortierville, Que.

Couplings, Shaft
Bilton Machine Co., Bridgeport, Conn.
Can. Link-Belt Co., Toronto, Ont.

Cranes, Electric
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que
Hepburn Ltd., John T., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Shepard Electric Crane & Hoist Co., Montour Falls, N.Y.

Cranes, Hand (See Hoists, Hand)
Dominion Bridge Co., Ltd., Lachine, Que
Hepburn Ltd., John T., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont
Sheffield Engineering Supplies, Ltd., Montreal, Que.

Cranes, Locomotive
Can. Link-Belt Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.

Cranes, Traveling
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que
Hepburn Ltd., John T., Toronto, Ont
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont

Crank Pin Turning Machines
Garlock-Walker Mchy. Co., Toronto, Ont
Herbert Ltd., Alfred, Toronto, Ont
Underwood Corp., B. B., Philadelphia, Pa.

Cutters, Fine
Holden Co., Ltd., Montreal, Que.

Cutters, Gear
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, High Speed
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.

Atkins & Co., Inc., E. C., Indianapolis, I
Bilton Machine Co., Bridgeport, Conn.
Butterfield & Co., Inc., Rock Island, Que.
Eclipse Counterbore Co., Ltd., Walkerville, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Kearney & Trecker Co., Milwaukee, Wis.
Madison Mfg. Co., Muskegon, Mich.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, Milling
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bilton Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Milling Machine Co., Cleveland
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.

Cutters, Stay Bolt
Acme Machinery Co., Cleveland, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Cutters, Thread
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.

Cutting-Off Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Garlock-Walker Mchy. Co., Toronto, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Cutting-Off Machines, Pipe (See Pipe Cutting and Threading Machines)
Landis Machine Co., Inc., Waynesboro, Pa.
McDougall Co., Ltd., R., Galt, Ont.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

Cutting-Off Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros. Tool Co., Chicago, Ill.
Pilot Steel & Tool Co., Montreal, Que.

Cutting Oil Filters (See Oil Filtering Systems)
Bowser, S. F., & Co., Ltd., Toronto, Can.
Cataract Refining Co., Toronto, Ont.

Cutting, Oxy-Acetylene
Carter Welding Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.
Turner Brass Works, Sycamore, Ill.
Union Carbide Co. of Can., Welland, Ont.

Cutting, Oxy-Hydrogen
National Electro Products, Ltd., Toronto, Ont.

Dealers, Machinery (See Searchlight Section)
Ford-Smith Machine Co., Hamilton, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Deckle Straps
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Diamonds, Black and Rough
Joyce-Koebel Co., Inc., New York, N.Y.

Diamond, Carbon and Bortz
Joyce-Koebel Co., Inc., New York, N.Y.

Diamond Tools
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Desmond-Stephan Co., Hamilton, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Wheel Trueing Tool Co., Detroit, Mich.

Diamond Crossings
Can. Steel Foundries, Montreal, Que.

Die-Castings
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Dies, Pipe-Threading
Jones & Lamson Machine Co., Springfield, Vt.

Die Sinking Machines, Automatic
Jones & Lamson Machine Co., Springfield, Vt.
Walcott Lathe Co., Jackson, Mich.

Die Sinkers
Kimber & Hillier, St. Catharines, Ont.

Dies, Screw and Thread Cutting
Ackworthie, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.

Dies, Sheet-Metal and Sub-Press (See Tool Work)
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Toledo Machine & Tool Co., Toledo, Ohio.

BUYERS' DIRECTORY

Dies, Forging
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Kimber & Hillier Mfg. Co., St. Catharines, Ont.

Dies, Hammer
Kimber & Hillier, St. Catharines, Ont.

Dies, Self-Opening, Adjustable
Can. Fairbanks-Morse Co., Ltd., Montreal.
Geometric Tool Co., New Haven, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
Prest-O-Lite Co. of Can., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Victor Tool Co., Waynesboro, Pa.

Dies, Threading-Opening
Jardine & Co., A. B., Hespeler, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rapid Tool & Machine Co., Lachine, Que.

Disc Cement
Ritchey Supply Co., Toronto, Ont.
Wausau Abrasives Co., Chicago, Ill.

Dividing Heads
Ackworthe, Ltd., John, Birmingham, Eng.
Dickow, Fred. C., Machinery Co., Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.

Dogs, Lathe and Milling Machine
Armstrong Bros. Tool Co., Chicago, Ill.

Drafting Boards and Tables
Darling Bros., Ltd., Montreal, Que.
Economy Drawing Table & Mfg. Co., Adrian, Mich.
Hughes Owens Co., Ltd., Montreal, Que.

Drafting Materials
American Lead Pencil Co., New York City, N.Y.
Darling Bros., Ltd., Montreal, Que.
Economy Drawing Table & Mfg. Co., Adrian, Mich.
Hughes Owens Co., Ltd., Montreal, Que.

Dressers, Grinding Wheel
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York, N.Y.
Norton Co. of Can., Ltd., Hamilton, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

Drill Holders
Armstrong Bros. Tool Co., Chicago, Ill.

Drill Rods
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Aikenhead Hardware Ltd., Toronto, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Drill Speeders
Canada Machinery Corp., Galt, Ont.

Drilling Machine Heads
Henry & Wright Mfg. Co., Hartford, Conn.
Hoefer Mfg. Co., Freeport, Ill.
United States Machine Tool Co., Cincinnati, Ohio.

Drilling Machines, Automatic
Hoosier Drilling Mach. Co., Goshen, Ind.
National Automatic Tool Co., Richmond, Ind.

Drilling Machines, Bench
Beacon Engineering Co., Tipton, England.
Can. Blower & Forge Co., Ltd., Kitchener.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Henry & Wright Mfg. Co., Hartford, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Terry & Co., John C., Birmingham, Eng.
U.S. Electrical Tool Co., Cincinnati, O.
Wisconsin Electric Co., Racine, Wis.

Drilling Machines, Electric and Hand
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Jardine & Co., A. B., Hespeler, Ont.
Wisconsin Electric Co., Racine, Wis.

Drilling Machines, Gang
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Drilling Machines, Heavy Duty
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hoosier Drilling Mach. Co., Goshen, Ind.
Rockford Lathe & Drill Co., Rockford, Ill.

Drilling Machines, Horizontal (See Boring, Drilling and Milling Machines, Horizontal)
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Holly, R. S., Toronto, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Rockford Lathe & Drill Co., Rockford, Ill.

Drilling Machines, Multiple Spindle
Beacon Engineering Co., Tipton, England.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Henry & Wright Mfg. Co., Hartford, Conn.
Hoefer Mfg. Co., Freeport, Ill.
National Acme Co., Cleveland, Ohio.
National Automatic Tool Co., Richmond, Ind.
Terry & Co., John C., Birmingham, Eng.

Drilling Machines, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.

Drilling Machines, Portable
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Jardine & Co., A. B., Hespeler, Ont.
Wisconsin Electric Co., Racine, Wis.

Drilling Machines, Radial
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Drilling Machines, Sensitive
Beacon Engineering Co., Tipton, England.
Bilton Machine Co., Bridgeport, Conn.
Henry & Wright Mfg. Co., Hartford, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Hoosier Drilling Mach. Co., Goshen, Ind.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Terry & Co., John C., Birmingham, Eng.
United States Machine Tool Co., Cincinnati, Ohio.
Williams Machinery Co., A. R., Toronto, Ont.
Wisconsin Electric Co., Racine, Wis.

Drilling Machines, Turret
Gisholt Machine Co., Madison, Wis.
Steinle Turret Machine Co., Madison, Wis.
Williams Machinery Co., A. R., Toronto, Ont.

Drilling Machines, Vertical
Aurora Tool Works, Aurora, Ind.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
Hoosier Drilling Mach. Co., Goshen, Ind.
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Rockford Lathe & Drill Co., Rockford, Ill.
Perfect Machine Co., Ltd., Galt, Ont.
Terry & Co., John C., Birmingham, Eng.
Stenzinger Co. of Can., Ltd., Chas. A., Windsor, Ont.

Drills, Center
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland, O.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Drills, High Speed Twist
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Butterfield & Co., Inc., Rock Island, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cleveland Twist Drill Co., Cleveland, O.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Lawson Tube & Supply Co., Montreal, Que.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Sheffield Engineering Supplies, Ltd., Montreal, Que.
Sheffield Twist Drill & Steel Co., Sheffield, Eng.

Drills, Ratchet
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland, O.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.

Drills, Twist and Flat
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland, O.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pilot Steel & Tool Co., Montreal, Que.

Dust Handling Equipment
Can. Blower & Forge Co., Ltd., Kitchener.
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Boston, Mass.

Electrical Instruments
Bristol Co., Waterbury, Conn.
Northern Electric Co., Montreal, Que.

Electrical Supplies
Atkins & Co., Inc., E. C., Indianapolis, I.
Diamond State Fibre Co., Toronto, Ont.
Northern Electric Co., Montreal, Que.
U.S. Electrical Tool Co., Cincinnati, O.

Elevating Trucks (See Trucks)
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Elevators and Conveyors
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Jones & Glassco, Montreal, Que
Lyman Tube & Supply Co., Montreal, Que.
Main Belting Co. of Can., Montreal, Que
Mathews Gravity Carrier Co., Port Hope, Ont.

Emery Wheels (See Grinding Wheels)
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I
Can. Hart Products, Ltd., Hamilton, Ont.
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont
Norton Co. of Can., Ltd., Hamilton, Ont.
Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont.

Engines, Capstan
Kennedy & Sons, Wm., Owen Sound, Ont

Engineers, Mechanical
Ford-Smith Machine Co., Hamilton, Ont
Gisholt Machine Co., Madison, Wis.
Hamilton Gear & Machine Co., Toronto, Ont.
Perdue, W. B., San Francisco, Calif

Expanders, Tube
Garlock-Walker Mchy. Co., Toronto, Ont
Holden Co., Ltd., Montreal, Que
Jardine & Co., A. B., Hespeler, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Eyeglasses, Safety (See Goggles, Safety)
Prest-O-Lite Co. of Can., Toronto, Ont
Wilson Goggles, Inc., Reading, Pa.

Fans, Electric
Can. Blower & Forge Co., Ltd., Kitchener
Can. Fairbanks-Morse Co., Ltd., Montreal
Northern Electric Co., Montreal, Que
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Boston, Mass.

Fans, Exhaust
Can. Blower & Forge Co., Ltd., Kitchener
Petrie, Ltd., H. W., Toronto, Ont
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Boston, Mass.

Fans, Ventilating
Can. Blower & Forge Co., Ltd., Kitchener
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que
Petrie, Ltd., H. W., Toronto, Ont
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Boston, Mass.

Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Northern Electric Co., Montreal, Que.

File Handles
Ingersoll Files Co., Ltd., Ingersoll, Ont.

Files and Rasps
Atkins & Co., Inc., E. C., Indianapolis, I.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Ingersoll Files Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Nicholson File Co., Port Hope, Ont.
Simonds Canada Saw Co., Montreal, Que.

Filing Machines
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Filler, Iron (See Cements, Iron)
Smooth Mfg. Co., Jersey City, N.J.

Fire Extinguishers
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Fittings, Pipe
International Malleable Iron Co., Guelph, Ont.

Flexible Shafts
Aikenhead Hardware Ltd., Toronto, Ont.

Flux, Galvanizing
British Smelting & Refining Co., Ltd., Montreal, Que.

Fluxes, Welding
L'Air Liquide Society, Toronto, Ont.

Forging Machinery
Acme Machinery Co., Cleveland, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Stewart & Co., Duncan, Glasgow, Scot.

Forgings, Drop
Canada Foundries & Forgings Co., Welland, Ont.
Dominion Forge & Stamping Co., Ltd., Toronto, Ont.

Forgings, Hammer
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hepburn Ltd., John T., Toronto, Ont.
N. S. Steel Co., Ltd., New Glasgow, N.S.
Steel Co. of Canada, Ltd., Hamilton, Ont.

Foundry Equipment
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Holden Co., Ltd., Montreal, Que.
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Rice Lewis & Son, Ltd., Toronto, Ont.

Foundry Supplies
Atkins & Co., Inc., E. C., Indianapolis, I.
Rice Lewis & Son, Ltd., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass.

Frogs, Spring or Rigid
Can. Steel Foundries, Montreal, Que.

Fuel Oil Burning System
General Combustion Co. of Can., Ltd., Montreal, Que.

Furnaces, Electric
Electric Furnace Construction Co., Philadelphia, Pa.
General Combustion Co. of Can., Ltd., Montreal, Que.
Rockwell Co., W. S., New York City.

Furnaces, Heat Treating Coal
General Combustion Co. of Can., Ltd., Montreal, Que.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City.

Furnaces, Heat Treating Oil and Gas
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Bellevue Industrial Furnace Co., Detroit.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal.
General Combustion Co. of Can., Ltd., Montreal, Que.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont

Furnaces and Ovens, Electric
Electric Furnace Construction Co., Philadelphia, Pa.
Peerless Co., H. W., Toronto, Ont.
Volta Mfg. Co., Welland, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Furnaces, Tempering and Annealing
Brown & Sharpe Mfg. Co., Providence, R.I.
Electric Furnace Construction Co., Philadelphia, Pa.
Mechanical Engineering Co., Three Rivers, Que.
Rockwell Co., W. S., New York City.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Furniture, Machine Shop
Garlock-Walker Mchy. Co., Toronto, Ont.

Gages, Comparator
Jones & Lamson Machine Co., Springfield, Vt.
Herbert Ltd., Alfred, Toronto, Ont.
Johansson Inc., C. E., Windsor, Ont
Perdue, W. B., San Francisco, Calif.
Starrett Co., L. S., Athol, Mass.

Gages, Measuring (See Tool Work)
Chesterman & Co., Ltd., J., Sheffield, Eng.
Crescent Machine Co., Ltd., Montreal, Q.
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont
Starrett Co., L. S., Athol, Mass.

Gages, Recording
Bristol Co., Waterbury, Conn.
Johansson Inc., C. E., Windsor, Ont.

BUYERS' DIRECTORY

Gages, Snap, Thread and Cylindrical
Ackworthie, Ltd., John, Birmingham, Eng.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Gages, Special Measuring (See Tool Work)
Greenfield Tap & Die Corp., Galt, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Gages, Standard
Armstrong Whitworth Co. of Can., Lt. Montreal, Que.
Atkins & Co., Inc., E. C., Indianapolis.
Johansson Inc., C. E., Windsor, Ont.

Gages, Thread
Ackworthie, Ltd., John, Birmingham, Eng.
Greenfield Tap & Die Corp., Galt, Ont.
Johansson Inc., C. E., Windsor, Ont.
Starrett Co., L. S., Athol, Mass.

Garnet, Emery and Flint Paper and Cloth
Ritchey Supply Co., Toronto, Ont.

Gas, Coal Compressed
L'Air Liquide Society, Toronto, Ont.

Gas, Compressed
Prest-O-Lite Co. of Can., Toronto, Ont.

Gaskets
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Smooth Mfg. Co., Jersey City, N.J.

Gear Blanks
Canada Foundries & Forgings Co., Welland, Ont.
Can. Steel Foundries, Montreal, Que.
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dom. Foundries & Steel, Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto, Ontario.
Philadelphia Gear Works, Philadelphia, Pa.

Gear-Cutting Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bilton Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Fellows Gear Shaper Co., Springfield, Vt.
Petrie, Ltd., H. W., Toronto, Ont.
Whiton Machine Co., D. E., New London, Conn.

Gear Testing Machines
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Machine Co., Hamilton, Ont.

Gears, Cast
Can. Link-Belt Co., Toronto, Ont.
Can. Steel Foundries, Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hull Iron & Steel Foundries, Hull, Que.

Gears, Cut
Brown & Sharpe Mfg. Co., Providence, R.I.
Canadian SKF Co., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal, Q.
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que.
Dom. Steel Products Co., Brantford, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Gardner & Son, Robt., Montreal, Que.
Hamilton Gear & Machine Co., Toronto, Ontario.
Hepburn Ltd., John T., Toronto, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
McDougall Co., Ltd., R., Galt, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Renold (Hans) of Canada, Ltd., Montreal, Que.

Gears, Dressed
Kennedy & Sons, Wm., Owen Sound, Ont.

Gears, Forged
Canada Foundries & Forgings Co., Welland, Ont.
Lyman Tube & Supply Co., Montreal, Que.

Gears, Herringbone
Dom. Steel Products Co., Brantford, Ont.
Hamilton Gear & Machine Co., Toronto, Ont.
Philadelphia Gear Works, Philadelphia, Pa.

Gears, Machine Moulded
Can. Steel Foundries, Montreal, Que.

Gears, Rawhide (See Gears, Cut)
Hamilton Gear & Machine Co., Toronto, Ontario.
Philadelphia Gear Works, Philadelphia, Pa.

Gear, Silent Chain
Gardner & Son, Robt., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Can. Link-Belt Co., Ltd., Toronto, Can.
Hans Renold of Canada, Ltd., Montreal, Quebec

Gears, Worm
Dom. Steel Products Co., Brantford, Ont.
Hamilton Gear & Machine Co., Toronto, Ontario.

Generators, Acetylene
L'Air Liquide Society, Toronto, Ont.

Generators, Electric
Holden Co., Ltd., Montreal, Que.
Northern Electric Co., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass.

Goggles, Safety
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont
Standard Optical Co., Geneva, N.Y.
Willson Goggles, Inc., Reading, Pa.

Grab Buckets
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Ltd., Lachine, Que.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.

Grease Cups, Pressed Steel and Brass
Can. Winkley Co., Ltd., Windsor, Ont.

Greases, Lubricating
Canadian SKF Co., Toronto, Ont.
Cataract Refining Co., Toronto, Ont.

Grinding Discs
Ritchey Supply Co., Toronto, Ont.

Grinding Machines
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.

Grinding Machines, Abrasive Belt
Beacon Engineering Co., Tipton, England.
Norton Co. of Can., Ltd., Hamilton, Ont.

Grinding Machines, Automatic
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Bench
Aikenhead Hardware Ltd., Toronto, Ont.
Blount Co., J. G., Everett, Mass.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Geometric Tool Co., New Haven, Conn.
Holly, R. S., Toronto, Ont.
La Salle Tool Co., La Salle, Ill.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
McDougall Co., Ltd., R., Galt, Ont.
Norton Co. of Can., Ltd., Hamilton, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Roelofson Machine & Tool Co., Toronto, Ont.
Waltham Grinding Wheel Co. of Canada, Brantford, Ont.
Terry & Co., John C., Birmingham, Eng.
Strelinger Co. of Can., Ltd., Chas. A., Windsor, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Grinding Machines, Center
U.S. Electrical Tool Co., Cincinnati, O.
Wisconsin Electric Co., Racine, Wis.

Grinding Machines Chaser
Jones & Lamson Machine Co., Springfield, Vt.

Grinding Machines, Cutter and Reamer
Cincinnati Milling Machine Co., Cincinnati, Ohio
Garlock-Walker Mchy. Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Cylindrical
Garlock-Walker Mchy. Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Die
Jones & Lamson Machine Co., Springfield, Vermont.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ont.

Grinding Machines, Disc
Beacon Engineering Co., Tipton, England.
Ford-Smith Machine Co., Hamilton, Ont.

Grinding Machines, Drill
Beacon Engineering Co., Tipton, England.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Holden Co., Ltd., Montreal, Que.

Grinding Machines, Face
Ford-Smith Machine Co., Hamilton, Ont.

Grinding Machines, Floor and Tool
Beacon Engineering Co., Tipton, England.
Blount Co., J. G., Everett, Mass.
Ford-Smith Machine Co., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
National Acme Co., Cleveland, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Terry & Co., John C., Birmingham, Eng.

Grinding Machines, Internal
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.

Grinding Machines, Portable
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Wisconsin Electric Co., Racine, Wis.

Grinding Machines, Power Oscillating Tool
Herbert Ltd., Alfred, Toronto, Ont.

Grinding Machines, Ring Wheel
Ford-Smith Machine Co., Hamilton, Ont

Grinding Machines, Snagging
Blount Co., J. G., Everett, Mass.
Ford-Smith Machine Co., Hamilton, Ont.
Norton Co. of Can., Ltd., Hamilton, Ont.

Grinding Machines, Surface
Garlock-Walker Mchy. Co., Toronto, Ont
La Salle Tool Co., Ltd., La Salle, Ill.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machines, Thread
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Grinding Machinery, Tool Post
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Gisholt Machine Co., Madison, Wis.
Wisconsin Electric Co., Racine, Wis.

Grinding Machines, Universal
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
La Salle Tool Co., Ltd., La Salle, Ill.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Roelofson Machine & Tool Co., Toronto, Ont.
Waltham Grinding Wheel Co. of Canada, Brantford, Ont.

Grinding Wheels
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Co., Ltd., Montreal
Dom. Abrasive Wheel Co., Ltd., Mimico, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Norton Co. of Can., Ltd., Hamilton, Ont.
Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont.

Guards, Emery Wheel
Ford-Smith Machine Co., Hamilton, Ont

Guards, Machinery and Window
Can. Wire & Iron Goods Co., Hamilton, Ont.

Guards, Electric Lamp
Flexible Steel Lacing Co., Chicago, Ill.

Gun-Barrel Machinery
Steinle Turret Machine Co., Madison, Wis.

Hack Saws, Power
Ackworthie, Ltd., John, Birmingham, Eng.
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Clemson Bros., Hamilton, Canada.
Garlock-Walker Mchy. Co., Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Simonds Canada Saw Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Hammers, Chipping
Cleveland Pneumatic Tool Co., Toronto, Ont.

Hammers, Drop
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Canada Machinery Corp., Galt, Ont.

Hammers, Electric
Aikenhead Hardware Ltd., Toronto, Ont.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Holden Co., Ltd., Montreal, Que.

Hammers, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich.

Hammers, Power
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Hammers, Rivetting
Cleveland Pneumatic Tool Co., Toronto, Ont.

Hangers, Shafting
Can. Link-Belt Co., Toronto, Ont.
Canadian SKF Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Terry & Co., John C., Birmingham, Eng.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Hardening, Case-Hardening and Tempering
Hamilton Gear & Machine Co., Toronto, Ont.

Hardness Testing Apparatus
Shore Instrument Co., Jamaica, N.Y.

Heating
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.

Hobbing Machines
Herbert Ltd., Alfred, Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Hobs
Armstrong-Whitworth of Canada, Ltd. Montreal, Canada.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Tap & Die Corp., Galt, Ont.
Pratt & Whitney Co., of Canada, Ltd. Dundas, Ont.

Hoists, Electric
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Shepard Electric Crane & Hoist Co., Montour Falls, N.Y.
Volta Mfg. Co., Welland, Ont.

Hoists, Hand
Lyman Tube & Supply Co., Montreal, Que.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

Hoists, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.

Holders-On, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.

Hose, Flexible Steel
Can. Fairbanks-Morse Co., Ltd., Montreal
Ontario Metal Products Co., Ltd., Toronto, Ont.

Hose, Industrial
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

Hose, Rubber
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Can. Foamite Firefoam Co., Hamilton Ont.

Hydraulic Leather
Graton & Knight Mfg. Co., Worcester, Mass.

Hydraulic Machinery
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Garlock-Walker Mchy Co., Toronto, Ont
Stewart & Co., Duncan, Glasgow, Scot.

Hydrogen
National Electro Products, Ltd., Toronto, Ont.

Index Centers
Dickow, Fred. C., Machinery Co., Chicago, Ill.

Igniters, Gas Engine
Canada Foundries & Forgings Co., Welland, Ont.

Indicators, Speed and Test
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Brown & Sharpe Mfg. Co., Providence, R.I.

Insulation
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.

Iron Valves
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

Jacks, Hydraulic
Norton, A. O., Boston, Mass.

Jacks, Planer
Armstrong Bros. Tool Co., Chicago, Ill.
Starrett Co., L. S., Athol, Mass.
Bilton Machine Co., Bridgeport, Conn.
Burgess & Marchand, Montreal, Que.
Crescent Machine Co., Ltd., Montreal, Q.

BUYERS' DIRECTORY

Jigs and Fixtures (See Tool Work)
Fisher Motor Co., Ltd., Orillia, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Hamilton Engineering Service, Ltd., Hamilton, Ont.
Rapid Tool & Machine Co., Lachine, Que.

Keyseating Machines
Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mchy. Co., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Keys, Machine
Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.

Knives, Machine
Atkins & Co., Inc., E. C., Indianapolis, I.
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Simonds Canada Saw Co., Montreal, Que.

Knurl Holders
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Lacing Leather
Clipper Belt Lacer Co., Grand Rapids, Mich.
Main Belting Co. of Can., Montreal, Que.

Lamps, Electric
Federal Eng'r'ng Co., Ltd., Toronto, Ont.
Northern Electric Co., Montreal, Que.

Lathe Attachments
Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.
Petrie, Ltd., H. W., Toronto, Ont.

Lathe Pans, Portable
Canada Machinery Corp., Galt, Ont.

Lathe Tools
Armstrong Bros Tool Co., Chicago, Ill.
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hendey Machine Co., Torrington, Conn.

Lathes, Automatic and Semi-Automatic
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
McDougall Co., Ltd., R., Galt, Ont.
National Acme Co., Cleveland, Ohio.
Steinle Turret Machine Co., Madison, Wis.

Lathes, Bench
Archibald & Co., Chas. P., Montreal, Q.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Lathes, Boring
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Steinle Turret Machine Co., Madison, Wis.

Lathes, Chucking (See Lathes, Horizontal Turret, and Lathes, Vertical Turret)
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
McDougall Co., Ltd., R., Galt, Ont.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Lathes, Engine
Archibald & Co., Chas. P., Montreal, Q.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Herbert Ltd., Alfred, Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Holly, R. S., Toronto, Ont.
Lehmann Machine Co., St. Louis, Mo.
McDougall Co., Ltd., R., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Lathe & Drill Co., Rockford, Ill.
Roelofson Machine & Tool Co., Toronto, Ont.
Sidney Machine Tool Co., Sidney, Ohio.
Strelinger Co. of Can., Ltd., Chas. A., Windsor, Ont.
Walcott Lathe Co., Jackson, Mich.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Lathes, Extension and Gap
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
McDougall Co., Ltd., R., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.

Lathes, Heavy Duty Projectile Boring
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Blaisdell Mach'y Co., Ltd., Montreal
Sidney Machine Tool Co., Sidney, Ohio
Steinle Turret Machine Co., Madison, Wis.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Lathes, Horizontal Turret
Acme Machine Tool Co., Cincinnati, Ohio.
Blount Co., J. G., Everett, Mass.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
McDougall Co., Ltd., R., Galt, Ont.
National Acme Co., Cleveland, Ohio.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Lathe & Drill Co., Rockford, Ill.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Lathes, Polishing (See Polishing and Buffing Machines)
Ford-Smith Machine Co., Hamilton, Ont.

Lathes, Relieving
Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
McDougall Co., Ltd., R., Galt, Ont.

Lathe, Universal Hand
Brown & Sharpe Mfg. Co., Providence, R.I.

Lathes, Screw-Cutting
Jones & Lamson Machine Co., Springfield, Vt.

Lathe, Speed and Hand
Blount Co., J. G., Everett, Mass.
Garlock-Walker Mchy. Co., Toronto, Ont
Greenfield Tap & Die Corp., Galt, Ont
Oliver Machy. Co., Grand Rapids, Mich.

Lathes, Spinning
Terry & Co., John C., Birmingham, Eng.

Lathes, Threading
Canada Machinery Corp., Galt, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.

Lathes, Vertical Turret
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
Roelofson Machine & Tool Co., Toronto, Ont.

Lathes, Wood Turning
Blount Co., J. G., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.

Lead Pipe
Steel Co. of Canada, Ltd., Hamilton, Ont.

Lighting Fixtures
Northern Electric Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.

Linoleum Mill Machinery
Bertrams Ltd., Edinburgh, Scotland.

Liquid Air Plants
L'Air Liquide Society, Toronto, Ont.

Lockers, Clothes
Can. Foamite Firefoam Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

Lubricants
Cataract Refining Co., Toronto, Ont.
Oakley Chemical Co., New York, N.Y.

Lubricating Systems
Bowser, S. F., & Co., Ltd., Toronto, Can.

Machinists' Small Tools
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada
Bertrams Ltd., Edinburgh, Scotland.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Fairbanks-Morse Ltd., Montreal, Q.
Dodge Mfg. Co. of Can., Toronto, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Ker & Goodwin Machine Co., Brantford, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rapid Tool & Machine Co., Lachine, Que.
Rice Lewis & Son, Ltd., Toronto, Ont
Rockford Milling Machine Co., Rockford, Ill.
Starrett Co., L. S., Athol, Mass.
Strelinger Co. of Can., Ltd., Chas. A., Windsor, Ont.
Wheel Trueing Tool Co., Detroit, Mich.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Manganese Steel
Can. Steel Foundries, Montreal, Que.

Mandrels, Expanding
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Mandrels, Solid
Atkins & Co., Inc., E. C., Indianapolis, I.
Cleveland Twist Drill Co., Cleveland, O.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Measuring Machines
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Metals, Alloy
British Smelting & Refining Co., Ltd. Montreal, Que.
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Can. Steel Foundries, Montreal, Que.
Deloro Smelting & Refining Co., Ltd., Toronto, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Hoyt Metal Co., Toronto, Ont.
International Nickel Co. of Can., Ltd., Toronto, Ont.
Magnolia Metal Co., Montreal, Que.
Moore & Son, Thos., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.
Tallman Brass & Metal, Ltd., Hamilton, Ontario.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Metalite Cloth
Ritchey Supply Co., Toronto, Ont.

Micrometer Calipers
Aikenhead Hardware Ltd., Toronto, Ont
Brown & Sharpe Mfg. Co., Providence, R.I.
Rice Lewis & Son, Ltd., Toronto, Ont.

Milling Attachments
Ackworthie, Ltd., John, Birmingham, Eng.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Ford-Smith Machine Co., Hamilton, Ont
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Petrie, Ltd., H. W., Toronto, Ont.

Milling Machines
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal.

Milling Machines, Automatic
Bilton Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Bench
Burke Machine Tool Co., Conneaut, Ohio
Garlock-Walker Mchy. Co., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Hand
Burke Machine Tool Co., Conneaut, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Rockford Milling Machine Co., Rockford, Ill
Terry & Co., John C., Birmingham, Eng.
United States Machine Tool Co., Cincinnati, Ohio.

Milling Machines, Horizontal and Planer Type
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Fairbanks-Morse Ltd., Montreal, Q.
Cleveland Milling Machine Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont
Gooley Edlund Inc., Cortland, N.Y.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Rockford Milling Machine Co., Rockford, Ill.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams Machinery Co., A. R., Toronto, Ont.

Milling Machines, Plain
Bilton Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Cleveland Milling Machine Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont
Gooley Edlund Inc., Cortland, N.Y.
Hendey Machine Co., Torrington, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis
Petrie, Ltd., H. W., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill
Terry & Co., John C., Birmingham, Eng.

Milling Machines, Thread
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Milling Machines, Universal
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada
Cincinnati Milling Machine Co., Cincinnati, Ohio
Ford-Smith Machine Co., Hamilton, Ont
Garlock-Walker Mchy. Co., Toronto, Ont
Hendey Machine Co., Torrington, Conn
Holly, R. S., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis
Petrie, Ltd., H. W., Toronto, Ont
Rockford Milling Machine Co., Rockford, Ill
Roelofson Machine & Tool Co., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Milling Machines, Vertical
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Kearney & Trecker Co., Milwaukee, Wis
Kempsmith Mfg. Co., Milwaukee, Wis.
Rockford Milling Machine Co., Rockford, Ill.
Williams Machinery Co., A. R., Toronto, Ont.

Monel Metal
International Nickel Co. of Can., Ltd., Toronto, Ont.

Motors, Electric
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Northern Electric Co., Montreal, Que
Petrie, Ltd., H. W., Toronto, Ont.
Sturtevant Co., B. F., Boston, Mass
Williams Machinery Co., A. R., Toronto, Ont.
Wisconsin Electric Co., Racine, Wis.

Moulded Rubber Goods
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Nail Machinery
Sleeper & Hartley, Inc., Worcester, Mass.

Nails and Staples
Steel Co. of Canada, Ltd., Hamilton, Ont

Nickel, Bars, Sheets, Wire, Etc.
International Nickel Co. of Can., Ltd., Toronto, Ont.

Nickel Plating Outfits
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Nickel Silver
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont

Nitrogen
L'Air Liquide Society, Toronto, Ont.

Nut Tappers (See Bolt and Nut Machinery)
Acme Machinery Co., Cleveland, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont
Can. Fairbanks-Morse Co., Ltd., Montreal.
Greenfield Tap & Die Corp., Galt, Ont.
National Acme Co., Cleveland, Ohio.

Nuts, Finished and Semi-finished
Galt Machine Screw Co., Galt, Ont.

Nuts, Machine Screw
Torrington Company, Ltd., Upper Bedford, Que.

Nuts, S.A.E., Plain and Castellated
Galt Machine Screw Co., Galt, Ont.

Oil Cocks and Burners
Pure Sanitary Drinking Fountain Co., Hayderville, Mass

Oil Filtering and Storage Systems
Bowser, S. F., & Co., Ltd., Toronto, Can

Oil Storage Engineers
Bowser, S. F., & Co., Ltd., Toronto, Can.

Oils
Canadian Oil Companies, Ltd., Toronto, Ont
Cataract Refining Co., Toronto, Ont
Imperial Oil Ltd., Toronto, Ont.

Oil Hole Covers
Can. Winkley Co., Ltd., Windsor, Ont

Oils, Soluble
Cataract Refining Co., Toronto, Ont
Imperial Oil Ltd., Toronto, Ont.

Oxygen
Carter Welding Co., Toronto, Ont
Dominion Oxygen Co., Toronto, Ont
L'Air Liquide Society, Toronto, Ont.

Oxy-Acetylene Apparatus
L'Air Liquide Society, Toronto, Ont.

Packing, Hydraulic
Can. Consolidated Rubber Co., Ltd., Montreal, Que
Graton & Knight Mfg. Co., Worcester, Mass
Guildford & Sons, Ltd., Halifax, N.S

Packing, Steam
Can. Consolidated Rubber Co., Ltd., Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Graton & Knight Mfg. Co., Worcester, Mass
Guildford & Sons, Ltd., Halifax, N.S

Paper Mill Conveyors
Bertrams Ltd., Edinburgh, Scotland

Patents
Fetherstonhaugh & Co., Ottawa, Ont
Marion & Marion, Montreal, Que.

Pans, Wet and Dry
Frost Mfg. Co., Chicago, Ill

Pattern-Shop Machinery (See Woodworking Machinery)
Canada Machinery Corp., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich

Patterns, Wood and Metal
Crescent Machine Co., Ltd., Montreal, Q
Victoria Foundry Co., Ltd., Ottawa, Ont
Wraggs Pattern Works, Galt, Ont.

Penstocks, Steel
MacKinnon Steel Co., Sherbrooke, Que

osphor Tin
British Smelting & Refining Co., Ltd., Montreal, Que.

otographic Duplicating Machines
Commercial Camera Co., Providence, R.I.

g Iron
Steel Co. of Canada, Ltd., Hamilton, Ont.

pe Bending Machines
American Pipe Bending Machine Co., Boston, Mass
Can. Fairbanks-Morse Co., Ltd., Montreal.
Underwood Corp., H. B., Philadelphia, Pa.
Williams Machinery Co., A. R., Toronto, Ont.

pe Couplings
Steel Co. of Canada, Ltd., Hamilton, Ont.

pe Cutting and Threading Machines
Can. Fairbanks-Morse Co., Ltd., Montreal.
Crane Ltd., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
McDougall Co., Ltd., R., Galt, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

pe and Nipple Threading Machines
Landis Machine Co., Inc., Waynesboro, Pa.

pe Fitters' Tools
Aikenhead Hardware Ltd., Toronto, Ont.
Crane Ltd., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.

pe Threading Die Heads
Landis Machine Co., Inc., Waynesboro, Pa.

ston-Ring Machines
National Acme Co., Cleveland, Ohio.
Steinle Turret Machine Co., Madison, Wis.

aners, Parallels
L. & P. Mfg. Co., Niagara Falls, Ont.

aning Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
L. & P. Mfg. Co., Niagara Falls, Ont.
Morton Mfg Co., Muskegon, Mich.
Oliver Machinery Co., Grand Rapids, Mich.
Williams Machinery Co., A. R., Toronto, Ont.

aning Machines, Rotary
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.

ate Rolls
Bertram & Son Co., Ltd., The John, Dundas, Ont.

umbers' Brass Goods
Puro Sanitary Drinking Fountain Co., Haydenville, Mass

eumatic Tools
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich.

olishing and Buffing Machines
Ackworthie, Ltd., John, Birmingham, Eng.
Archibald & Co., Chas. P., Montreal, Q.
Blount Co., J. G., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Hanson & Van Winkle Co., Ltd., Toronto, Ont.
Ford-Smith Machine Co, Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Terry & Co., John C., Birmingham, Eng.

ots, Steel
Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.

ressed Steel Parts
Ackworthie, Ltd., John, Birmingham, Eng.
American Pulley Co., Philadelphia, Pa.
Fisher Motor Co., Ltd., Orillia, Ont.

resses, Arbor
Atlas Press Co., Kalamazoo, Mich.
Can. Fairbanks-Morse Co., Ltd., Montreal.
L. & P. Manufacturing Company, Ltd., Niagara Falls, Ont
National Engineering Co., Sarnia, Ont.
Petrie, Ltd., H. W., Toronto, Ont
Strelinger Co of Can., Ltd., Chas. A., Windsor, Ont.

resses, Drop and Forging
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Foundries & Forgings Co., Welland, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Toledo Machine & Tool Co., Toledo, Ohio.

resses, Foot and Hand
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Terry & Co., John C., Birmingham, Eng.

resses, Forcing
Atlas Press Co., Kalamazoo, Mich.
Stewart & Co., Duncan, Glasgow, Scot.

resses, Hydraulic
Baird Machine Co., Bridgeport, Conn.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Laurie Mfg. Co., Springfield, Ill.
Ferrin Ltd., W. R., Toronto, Ont.
Stewart & Co., Duncan, Glasgow, Scot.
Williams Machinery Co., A. R., Toronto, Ont.

BUYERS' DIRECTORY

Presses, Power
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Stall Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, Ohio.

Presses, Screw
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

Profiling Machines
Aikenhead Hardware Ltd., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Protractors
Brown & Sharpe Mfg. Co., Providence, R.I.

Propellers
Kennedy & Sons, Wm., Owen Sound, Ont.

Pulleys, Cork Insert
American Pulley Co., Philadelphia, Pa.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Positive Clutch & Pulley Works, Toronto, Ont.

Pulleys, Metal and Fibre
American Pulley Co., Philadelphia, Pa.
Bernard Industrial Co., A., Fortierville, Que.
Can. Fairbanks-Morse Ltd., Montreal. Q.
Canadian SKF Co., Toronto, Ont.
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Johnson Machine Co., Carlyle, Manchester, Conn.
Kennedy & Sons, Wm., Owen Sound, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Pulp and Paper Mill Equipment
MacKinnon Steel Co., Sherbrooke, Que.

Pumps, Automobile Tire
Taliman Brass & Metal, Ltd., Hamilton, Ont.

Pumps, Barrel and Boiler-feed
Trahern Pump Co., Rockford, Ill.

Pumps, Circulating and Coolant
Trahern Pump Co., Rockford, Ill.

Pumps, Geared and Hand
Trahern Pump Co., Rockford, Ill.

Pumps, Industrial
Trahern Pump Co., Rockford, Ill.

Pumps, Hydraulic
Can. Fairbanks-Morse Co., Ltd., Montreal
Can. Ingersoll-Rand Co., Ltd., Sherbrooke Que.
Electric Steel & Engineering Co., Welland, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Stewart & Co., Duncan, Glasgow, Scot.
Trahern Pump Co., Rockford, Ill.

Pumps, Lubricant and Oil
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Blower & Forge Co., Ltd., Kitchener.
Hepburn Ltd., John T., Toronto, Ont.
McDougall Co., Ltd., R., Galt, Ont.
Trahern Pump Co., Rockford, Ill.

Pumps, Power
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Blower & Forge Co., Ltd., Kitchener.
Can. Fairbanks-Morse Ltd., Montreal. Q.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Hepburn Ltd., John T., Toronto, Ont.
Trahern Pump Co., Rockford, Ill.

Punches, Center
Brown & Sharpe Mfg. Co., Providence, R.I.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Starrett Co., L. S., Athol, Mass.

Punches, Hand
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Jardine & Co., A. B., Hespeler, Ont.

Punches, Power
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Garlock-Walker Mchy. Co., Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo, Ohio.

Punching Machines, Horizontal
Bertrams Ltd., Edinburgh, Scotland.

Pyrometers, Electric
Bristol Co., Waterbury, Conn.
General Combustion Co. of Can., Ltd., Montreal, Que.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Racks, Cut
Ford-Smith Machine Co., Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto, Ont.

Racks, Storage (See Furniture, Machine Shop)
Brantford Oven & Rack Co., Brantford, Ont.

Rammers, Foundry
Holden Co., Ltd., Montreal, Que.

Reamer Holders
Cleveland Twist Drill Co., Cleveland, O.
Gisholt Machine Co., Madison, Wis.
Victor Tool Co., Waynesboro, Pa.

Reamers, Expanding
Aikenhead Hardware Ltd., Toronto, Ont.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
McCroskey Tool Corp., Meadville, Pa.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Reamers, Solid
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Butterfield & Co., Inc., Rock Island, Que.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.

Reamers, Taper
Butterfield & Co., Inc., Rock Island, Que.
Can. Detroit Twist Drill Co., Walkerville, Ont.
Cleveland Twist Drill Co., Cleveland, O.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Garlock-Walker Mchy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Galt, Ont.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Recorders, Temperature
Taylor Instrument Co., Rochester, N.Y.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Recorders, Time
Gisholt Machine Co., Madison, Wis.
International Business Machines Co., Toronto, Ont.

Regulators, Automatic (for electric furnaces)
Volta Mfg. Co., Welland, Ont.

Rheostats
Northern Electric Co., Montreal, Que.

Resistance Materials
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Respirators
Willson Goggles, Inc., Reading, Pa.

Rivets
Parmenter & Bulloch Co., Gananoque, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que.

Rivet Heaters
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
General Combustion Co. of Can., Ltd., Montreal, Que.
Volta Mfg. Co., Welland, Ont.

Rivet-Making Machinery
Acme Machinery Co., Cleveland, Ohio.
Bertram & Son Co., Ltd., The John, Dundas, Ont.
National Machinery Co., Tiffin, Ohio.

Riveting Machines
Bilton Machine Co., Bridgeport, Conn.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
High Speed Hammer Co., Rochester, N.Y.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich.
Parmenter & Bulloch Co., Gananoque, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Schuster Co., F. B., New Haven, Conn.

Rolling Mill Equipment
Stewart & Co., Duncan, Glasgow, Scot.

Rolls (Rubber Covered)
Can. Consolidated Rubber Co., Ltd., Montreal, Que.

Rudder Frames, Steel
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Rubber Goods, Mechanical
Quaker City Rubber Co., Philadelphia, Pa.

Rules, Steel
Chesterman & Co., Ltd., J., Sheffield, Eng

Rules, Steel and Wood
Brown & Sharpe Mfg. Co., Providence, R.I

Rust Preventatives
Oakley Chemical Co., New York, N.Y.

Sand Equipment
Can. Link-Belt Co., Toronto, Ont.

Sand Mills
Frost Mfg. Co. Chicago, Ill.

Sanding Machinery
Oliver Machy. Co., Grand Rapids, Mich.

Sand Rammers, Pneumatic
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.
Keller Pneumatic Tool Co., Grand Haven, Mich.

Saw Frames and Blades, Hack
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Clemson Bros., Inc., Hamilton, Ont.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Simonds Canada Saw Co., Montreal, Que

Sawing Machines, Metal
Atkins & Co., Inc., E. C., Indianapolis, I
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Herbert Ltd., Alfred, Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que

Sawing Machines, Power Hack
Ackworthie, Ltd., John, Birmingham, Eng.
Atkins & Co., Inc., E. C., Indianapolis, I.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Saw Sharpening Machines
Atkins & Co., Inc., E. C., Indianapolis, I.
Oliver Machinery Co., Grand Rapids, Mich.

Saw Tables, Universal
Atkins & Co., Inc., E. C., Indianapolis, I.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Petrie, Ltd., H. W., Toronto, Ont.

Saws, Circular Metal
Atkins & Co., Inc., E. C., Indianapolis, I.
Simonds Canada Saw Co., Montreal, Que.
Tabor Mfg. Co., Philadelphia, Pa.

Saws, Hand
Aikenhead Hardware Ltd., Toronto, Ont.
Atkins & Co., Inc., E. C., Indianapolis, I.
Simonds Canada Saw Co., Montreal, Que.

Saws, Hot and Cold
Atkins & Co., Inc., E. C., Indianapolis, I.
Simonds Canada Saw Co., Montreal, Que.
Stewart & Co., Duncan, Glasgow, Scot.

Saws, High Speed Steel
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Atkins & Co., Inc., E. C., Indianapolis, I.
Butterfield & Co., Inc., Rock Island, Que.
Clemson Bros., Hamilton, Canada.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que.

Saws, Metal Band
Atkins & Co., Inc., E. C., Indianapolis, I.
Oliver Machinery Co., Grand Rapids, Mich.

Saws, Metal, Power
Clemson Bros., Inc., Hamilton, Ont.

Saws, Metal Cutting
Atkins & Co., Inc., E. C., Indianapolis, I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Clemson Bros., Inc., Hamilton, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.

Saws, Milling
Atkins & Co., Inc., E. C., Indianapolis, I.
Butterfield & Co., Inc., Rock Island, Que
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Saws, Screw Slotting
Atkins & Co., Inc., E. C., Indianapolis, I.
Butterfield & Co., Inc., Rock Island, Que.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Simonds Canada Saw Co., Montreal, Que

Saws, Swing Cut-off
Oliver Machinery Co., Grand Rapids, Mich

Scales
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Ltd., Montreal. Q

Screens
Can. Wire & Iron Goods Co., Hamilton, Ont.

Screw Drivers, Optical, Jewelry and Novelty
Torrington Co., Ltd., Upper Bedford, Que.

Screw Driving Machine
Canada Machinery Corp., Galt, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill

Screw Extractors
Cleveland Twist Drill Co., Cleveland, O

Screw Machine Work
Barnes Co., Wallace, Bristol, Conn.
Cook Co., Asa S., Hartford, Conn.
National Acme Co., Cleveland, Ohio.
Taliman Brass & Metal Co., Hamilton, Ont.

BUYERS' DIRECTORY

Screw Machinery, Wood and Lag
Cook Co., Asa S., Hartford, Conn.

Screw Machines
Brown & Sharpe Mfg. Co., Providence, R. I.

Screw Machines, Automatic
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
National Acme Co., Cleveland, Ohio.

Screw Machines, Plain or Hand
Acme Machine Tool Co., Cincinnati, Ohio.
Greenfield Tap & Die Corp., Galt, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield, Vermont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Warner & Swasey Co., Cleveland, Ohio.

Screw Machine Products
Torrington Company, Ltd., Upper Bedford, Que.

Screw Plates
Aikenhead Hardware Ltd., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.

Screws, Cap and Set
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
National Acme Co., Cleveland, Ohio.
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Lock Cap
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Machine
Barnes Co., Wallace, Bristol, Conn.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Safety Set
Barnes Co., Wallace, Bristol, Conn.
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Screws, Side Knob
Torrington Company, Ltd., Upper Bedford, Que.

Screws, Thumb
Torrington Company, Ltd., Upper Bedford, Que

Second-Hand Machinery
(See Searchlight Section)
Petrie Ltd., H. W., Toronto, Ont.

Separators, Moisture and Oil
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que

Separators, Oil and Waste
Bowser, S. F., & Co., Ltd., Toronto, Can.

Shafting
Canada Foundries & Forgings Co., Welland, Ont.
Can. Drawn Steel Co., Hamilton, Ont.
N.S. Steel Co., Ltd., New Glasgow, N.S.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Shapes, Cold-Drawn Special Steel
Union Drawn Steel Co., Hamilton, Ont.

Shaping Machines
Canada Machinery Corp., Galt, Ont.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Hendey Machine Co., Torrington, Conn.
Herbert Ltd., Alfred, Toronto, Ont.
Holly, R. S., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.
McDougall Co., Ltd., R., Galt, Ont.
Roelofson Machine & Tool Co., Toronto, Ont
Smith & Mills Co., Cincinnati, Ohio
Walcott Lathe Co., Jackson, Mich.
Williams Machinery Co., A. R., Toronto, Ont.

Shapers, Wood
Oliver Machinery Co., Grand Rapids, Mich.

Shears, Hand
Can. Blower & Forge Co., Ltd., Kitchener.

Shears, Power
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Blower & Forge Co., Ltd., Kitchener.
Stall Co., Inc., D. H., Buffalo, N.Y.
Stout & Co., Duncan, Glasgow, Scot.
Toledo Machine & Tool Co., Toledo, Ohio
Williams Machinery Co., A. R., Toronto, Ont.

Shearing Machines, Angle, Iron Bar and Gate
Bertrams Ltd., Edinburgh, Scotland.

Sheet Metal Working Machinery
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.
Stall Co., Inc., D. H., Buffalo, N.Y.
Terry & Co., John C., Birmingham, Eng.
Toledo Machine & Tool Co., Toledo, Ohio.

Sheets, Nickel, Resist, Alloy
International Nickel Co. of Can., Ltd., Toronto, Ont.

Sheets, Nickel, Monel and Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.

Side Frames, Locomotive
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont

Slotting Attachments
Ford-Smith Machine Co., Ltd., Hamilton, Ont
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
National Acme Co., Cleveland, Ohio.

Slotting Machines
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Solders
British Smelting & Refining Co., Ltd., Montreal, Que.
Hoyt Metal Co., Toronto, Canada.

Snap Flasks
Oliver Mchy. Co., Grand Rapids, Mich

Special Machinery and Tools
Brown Engineering Corp., Ltd., Toronto.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.
National Acme Co., Cleveland, Ohio.

Specialties, Swaged and Headed Work
Torrington Company, Ltd., Upper Bedford, Que.

Spectacles, Industrial
Willson Goggles, Inc., Reading, Pa.

Springs
Barnes Co., Wallace, Bristol, Conn.
Cleveland Wire Spring Co., Cleveland, O.
Dunbar Bros. Co., Bristol, Conn.
Steele Ltd., James, Guelph, Ont.

Spring-making Machinery
Sleeper & Hartley, Inc., Worcester, Mass.

Sprockets and Chains
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Renold (Hans) of Canada, Ltd., Montreal, Que.

Squares
Brown & Sharpe Mfg. Co., Providence, R.I.

Stamping, Metal
American Pulley Co., Philadelphia, Pa.
Barnes Co., Wallace, Bristol, Conn.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Fisher Motor Co., Ltd., Orillia, Ont.
Keller Pneumatic Tool Co., Grand Haven, Mich
Parmenter & Bulloch Co., Gananoque, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Stamps, Steel
Diamond Saw & Stamping Works, Buffalo, N.Y.

Stairways, Wrought Iron
Can. Wire & Iron Goods Co., Hamilton, Ont.

Steam Specialties
Crane Ltd., Montreal, Que.

Steel Plate
Dom. Foundries & Steel, Hamilton, Ont.

Steels, Tool
Can. Atlas Crucible Steel Co., Toronto, Ont.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel Blooms and Billets
Steel Co. of Canada, Ltd., Hamilton, Ont.

Steel, Cold-Rolled Strip
Andrews Steel Co., Newport, Ky.
Barnes Co., Wallace, Bristol, Conn.
Can. Driver-Harris Co., Walkerville, Ont
Firth & Sons, Ltd., Thos., Montreal, Q.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Steel Castings
Dom. Foundries & Steel, Hamilton, Ont

Steel Forgings
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Steel, Shafting and Free Cutting Screw
Barnes Co., Wallace, Bristol, Conn
Can. Drawn Steel Co., Hamilton, Ont
Union Drawn Steel Co., Hamilton, Ont

Steel, Sheet
Dominion Foundries & Steel, Ltd., Hamilton, Ont
Firth & Sons, Ltd., Thos., Montreal, Q.
Ontario Metal Products Co., Ltd., Toronto, Ont.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont
Toronto Iron Works, Toronto, Ont

Steel, Tanks
Can. Johns-Wood Mfg. Co., Toronto, Ont

Steel, Stainless
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Vanadium Alloys Steel, Latrobe, Pa.

Steel Wire Rods
Steel Co. of Canada, Ltd., Hamilton, Ont.

Steels, Alloy, Open Hearth and Electric
Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.
United Alloy Steel Corp., Canton, Ohio.

Steels, Alloy and Carbon
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Andrew Steel Co., Newport, Ky.
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnes Co., Wallace, Bristol, Conn.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Can. Driver-Harris Co., Walkerville, Ont.
Can. Steel Foundries, Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Firth & Sons, Ltd., Thos., Montreal, Q.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.
United Alloy Steel Corp., Canton, Ohio.
Vanadium Alloys Steel, Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steels, High-Speed
Armstrong Bros. Tool Co., Chicago, Ill.
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Baines & David, Ltd., Toronto, Ont.
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.
Drury Ltd., H. A., Montreal, Que.
Firth & Sons, Ltd., Thos., Montreal, Q.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Steel Co. of Can., Ltd., Hamilton, Ont.
Vanadium Alloys Steel, Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel, Magnet
Can. Atlas Crucible Steel Co., Toronto, Ont
Vanadium Alloys Steel, Latrobe, Pa.

Steel, Structural
MacKinnon Steel Co., Sherbrooke, Que.

Steel Tubing, Close Joint and Welded
Standard Tube & Fence Co., Ltd., Woodstock, Ont.

Stern Frames, Cast Steel
Can. Steel Foundries, Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Straightening Machinery
Bertrams Ltd., Edinburgh, Scotland.

Studs
Galt Machine Screw Co., Galt, Ont.

Surface Plates
Bilton Machine Co., Bridgeport, Conn.

Swaging Machines
Atkins & Co., Inc., E. C., Indianapolis, I

Switches, Railway
Can. Steel Foundries, Montreal, Que.

Switches and Switchboards
Northern Electric Co., Montreal, Que.

Tablets, Bronze, Memorial
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Tachometers
Aikenhead Hardware Ltd., Toronto, Ont.
Bristol Co., Waterbury, Conn.

Tanks, Steel
MacKinnon Steel Co., Sherbrooke, Que.

Tanks and Pumps, Oil
Bowser, S. F., & Co., Ltd., Toronto, Can.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Toronto, Ont.

Taper Cutting Dies
Jones & Lamson Machine Co., Springfield, Vt.

Tap Holders
Greenfield Tap & Die Corp., Galt, Ont
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Taper Pins
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Tapes, Measuring
Chesterman & Co., Ltd., J., Sheffield, Eng.
Starrett Co., L. S., Athol, Mass.

Tapping Machines and Attachments
Ackworthy, Ltd., John, Birmingham, Eng.
Archibald & Co., Chas. P., Montreal, Q.
Butler Machine Tool Co., Conneaut, Ohio
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Jardine & Co., A. B., Hespeler, Ont.
National Acme Co., Cleveland, Ohio
Robinson, Ltd., H. W., Toronto, Ont.
Starrett Co., L. S., Athol, Mass.

Taps and Dies
Ackworthy, Ltd., John, Birmingham, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
International Machinery & Supply Co., Montreal, Que.
Jardine & Co., A. B., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Taps, Collapsing
Geometric Tool Co., New Haven, Conn.
Jardine & Co., A. B., Hespeler, Ont.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.

Teeth, Dredge Bucket
Kennedy & Sons, Wm., Owen Sound, Ont.

Testing Metals and Materials
Toronto Testing Laboratory, Toronto, Ont.

Thermometers
Bristol Co., Waterbury, Conn.

Thread-Cutting Tools
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vermont.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Victor Tool Co., Waynesboro, Pa.

Thread Cutting Machines
Jones & Lamson Machine Co., Springfield, Vermont.
Landis Machine Co., Inc., Waynesboro, Pa.

Threaded Wires
Torrington Company, Ltd., Upper Bedford, Que.

Threading Machines
Acme Machinery Co., Cleveland, Ohio.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Jones & Lamson Machine Co., Springfield, Vt.
Murchey Machine & Tool Co., Detroit, Mich
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams Tool Corp. of Can., Ltd., Brantford, Ont.

Thread Lead Testing Machines
Jones & Lamson Machine Co., Springfield, Vt.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Thread-Rolling Machines
Bliss Co., E. W., Brooklyn, N.Y.

Tongs
Hepburn Ltd., John T., Toronto, Ont.

Tool Cases
Rice Lewis & Son, Ltd., Toronto, Ont.

Tool Holders
Armstrong Bros. Tool Co., Chicago, Ill.
Bilton Machine Co., Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y

Tool Markers, Electric
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Tool Posts, Lathe
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y

Tool Steels for all Purposes
Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Tools, Small (See Machinists' Small Tools)
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.
Armstrong Bros. Tool Co., Chicago, Ill.
Bertrams Ltd., Edinburgh, Scotland.
Burgess & Marchand, Montreal, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Chesterman & Co., Ltd., J., Sheffield, Eng.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Galt, Ont.
Hamilton Engineering Service, Ltd., Hamilton, Ont.
Keller Pneumatic Tool Co., Grand Haven, Mich.
Kinnear & Hillier Mfg. Co., St. Catharines, Ont.
National Machine Tool Co., Racine, Wis.
Rapid Tool & Machine Co., Lachine, Que.
Rice Lewis & Son, Ltd., Toronto, Ont.
Rockford Milling Machine Co., Rockford, Ill.
Starrett Co., L. S., Athol, Mass.
Strainsor Co. of Can., Ltd., Chas. A. Windsor, Ont.
Wheel Trueing Tool Co., Detroit, Mich.
Williams Machinery Co., A. R., Toronto, Ont.
Williams Machinery & Supply Co., A. R., Montreal, Que.

Tool Work
Brown Engineering Corp., Ltd., Toronto
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont.

BUYERS' DIRECTORY

Torches, Blow
National Electro Products, Ltd., Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.
Rice Lewis & Son, Ltd., Toronto, Ont.

Trackwork, Railway
Can. Steel Foundries, Montreal, Que.

Trackwork, Manganese Steel
Can. Steel Foundries, Montreal, Que.

Transformers
Northern Electric Co., Montreal, Que.

Transmission Machinery
Bernard Industrial Co., A., Fortierville Que.
Can. Link-Belt Co., Toronto, Ont.
Garlock-Walker Mchy. Co., Toronto, Ont
Jones & Glassco, Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont
Petrie, Ltd., H. W., Toronto, Ont.
Positive Clutch & Pulley Works, Toronto, Ont.
Renold (Hans) of Canada, Ltd., Montreal Que.

Transportation Systems (See Trucks)
Mathews Gravity Carrier Co., Port Hope, Ont.

Treated Bits
Can. Atlas Crucible Steel Co., Toronto Ont
Vanadium Alloys Steel, Latrobe, Pa.

Trolleys and Tramways
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.

Trucks
Can. Fairbanks-Morse Ltd., Montreal, Q.
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Hepburn Ltd., John T., Toronto, Ont.
Maple Leaf Mfg. Co., Montreal, Que.
Morris Crane & Hoist Co., Ltd., Niagara Falls, Ont.
National Steel Car Corp., Ltd., Hamilton, Ont.

Trucks, Industrial Motor
Maple Leaf Mfg. Co., Montreal, Que.
National Steel Car Corp., Ltd., Hamilton, Ont.

Tube, Products
Tube Co. of Canada, Toronto, Ont.

Tubing, Electric Welded or Oxy-Acetylene Welded
Tube Co. of Canada, Toronto, Ont.

Tubing, Flexible
Dunlop Tire & Rubber Goods Co., Ltd. Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

Tubing, Seamless Steel
Tube Co. of Canada, Toronto, Ont.

Tubing, Seamless Steel, Brass and Copper and Fibre
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.
Dom. Steel Products Co., Brantford, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Ontario Metal Products Co., Ltd., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Tubing, Welded
International Nickel Co. of Can., Ltd., Toronto, Ont.
Ontario Metal Products Co., Ltd., Toronto, Ont.

Tubing, Welded Steel
Tube Co. of Canada, Toronto, Ont.

Turbines, Water
Kennedy & Sons, Wm., Owen Sound, Ont.

Turret Heads
Ackworthie, Ltd., John, Birmingham, Eng.
Bertram & Son Co., Ltd., The John, Dundas, Ont.

Turret Machines (See Lathes, Horizontal Turret)
Acme Machine Tool Co., Cincinnati, Ohio.
Cook Co., Asa S., Hartford, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vermont.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.
Steinle Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Turrets, Tool Post
Gisholt Machine Co., Madison, Wis.

Unions, Pipe
Crane Ltd., Montreal, Que.

Universal Joints
Ford-Smith Machine Co., Hamilton, Ont.
Holden Co., Ltd., Montreal, Que.

Valves
Can. Fairbanks-Morse Ltd., Montreal, Q.
Cleveland Pneumatic Tool Co., Toronto, Ont.
Crane Ltd., Montreal, Que.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

Vises, Drilling Machine
Hoosier Drilling Mach. Co., Goshen, Ind.
Kempsmith Mfg. Co., Milwaukee, Wis.

Vises, Metal Workers'
Aikenhead Hardware, Ltd., Toronto, Ont.
Columbia Hdwe. Division, Cleveland, O.

Vises, Milling Machine
Brown & Sharpe Mfg. Co., Providence, R.I.
Crescent Machine Co., Ltd., Montreal, Q.
Ford-Smith Machine Co., Hamilton, Ont.
Hendey Machine Co., Torrington, Conn.
Hoosier Drilling Mach. Co., Goshen, Ind.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.

Vises, Pipe
Columbia Hdwe. Division, Cleveland, O.
Greenfield Tap & Die Corp., Galt, Ont.

Vises, Planer and Shaper
Bertram & Son Co., Ltd., The John, Dundas, Ont.
Hendey Machine Co., Torrington, Conn.
Hoosier Drilling Mach. Co., Goshen, Ind.
Kempsmith Mfg. Co., Milwaukee, Wis.
McDougall Co., Ltd., R., Galt, Ont.
Superior Machine Co., London, Ont.

Vises, Wood Workers'
Columbia Hdwe. Division, Cleveland, O.
Foss Machinery & Supply Co., Geo. F., Montreal, Que.
Oliver Machy. Co., Grand Rapids, Mich
Victor Tool Co., Waynesboro, Pa.
Parmenter & Bulloch Co., Gananoque, Ont.

Voltmeters
Bristol Co., Waterbury, Conn.
Northern Electric Co., Montreal, Que.

Wagon Loaders
Can. Link-Belt Co., Toronto, Ont.

Washers
Barnes Co., Wallace, Bristol, Conn.
Diamond State Fibre Co., Toronto, Ont.
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
McLaren Belting Co., J. C., Montreal, Que.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Torrington Company, Ltd., Upper Bedford, Que.

Washers, Rubber
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Welding Apparatus, Oxy-Acetylene
L'Air Liquide Society, Toronto, Ont.

Welding, Electric
All-Weld Company, Toronto, Ont.
Carter Welding Co., Toronto, Ont.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.

Welding Filler Rods
L'Air Liquide Society, Toronto, Ont.
National Electro Products, Ltd., Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.

Welding Machines, Oxy-Acetylene
Davis-Bournonville Co., Jersey City, N.J.
Holden Co., Ltd., Montreal, Que.
L'Air Liquide Society, Toronto, Ont.
Perdue, W. B., San Francisco, Calif
Prest-O-Lite Co. of Can., Toronto, Ont.

Welding, Oxy-Acetylene
Carter Welding Co., Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.J.
Holden Co., Ltd., Montreal, Que.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.
Prest-O-Lite Co. of Can., Toronto, Ont.
Union Carbide Co. of Can., Welland, Ont.

Welding Rod, Tobin, Manganese Bronze and Aluminum
Tallman Brass & Metal, Ltd., Hamilton, Ont.

Welding Supplies
British Smelting & Refining Co., Ltd., Montreal, Que.
Carter Welding Co., Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.J.
L'Air Liquide Society, Toronto, Ont.
Lincoln Electric Co., Toronto, Ont.
National Electro Products, Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Canada, Ltd., Toronto, Ont.
Union Carbide Co. of Can., Welland, Ont.

Wheels, Cast, Steel
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Wheels, Industrial
American Pulley Co., Philadelphia, Pa.
Hull Iron & Steel Foundries, Hull, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.

Winches, Electric
Shepard Electric Crane & Hoist Co., Montour Falls, N.Y.
Volta Mfg. Co., Welland, Ont.

Winches, Headgate
Kennedy & Sons, Wm., Owen Sound, Ont.

Winches, Stoplog
Kennedy & Sons, Wm., Owen Sound, Ont.

Wire
Barnes Co., Wallace, Bristol, Conn.
Canada Metal Co., Ltd., Toronto, Ont.
Dennis Wire & Iron Works, London, Ont
Greening Wire Co., B., Hamilton, Ont.
Northern Electric Co., Montreal, Que.

Wire Cloth
Can. Wire & Iron Goods Co., Hamilton, Ont.

Wire Coiling Machinery
Sleeper & Hartley, Inc., Worcester, Mass.

Wire Rope
Can. Wire & Iron Goods Co., Hamilton, Ont.

Wire Straightening and Cutting Machinery
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs & Co., Ltd., Hamilton, Ont
Schuster Co., F. B., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

Wire, Welding
L'Air Liquide Society, Toronto, Ont.
National Electro Products, Ltd., Toronto, Ont.
Perdue, W. B., San Francisco, Calif.
Prest-O-Lite Co. of Can., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Wires, Special
Dennis Wire & Iron Works, London, Ont.
Greening Wire Co., B., Hamilton, Ont.
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

Woodworking Machinery
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Mchy. Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Williams Machinery Co., A. R., Toronto, Ont.

Wrenches, Drop Forged
Armstrong Bros. Tool Co., Chicago, Ill.
Canada Foundries & Forgings Co., Welland, Ont.

Wrenches, Machinists'
Armstrong Bros. Tool Co., Chicago, Ill
Canada Foundries & Forgings Co., Welland, Ont.

Wrenches, Pipe
Canada Foundries & Forgings Co., Welland, Ont.
Crane Ltd., Montreal, Que.
Greenfield Tap & Die Corp., Galt, Ont.

Wrenches, Tap
Butterfield & Co., Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Galt, Ont.

Wrought Iron Pipe
Steel Co. of Canada, Ltd., Hamilton, Ont.

DIRECTORY OF DEALERS

THE Buyers' Directory of CANADIAN MACHINERY was originally intended to contain information regarding lines actually manufactured by our advertisers. We now carry the advertising of leading machinery dealers, some of whom represent scores of manufacturers in addition to being manufacturers themselves in some cases. This necessarily widened the scope of our Directory, but it would be impracticable to list all the lines handled by all the dealers. We recommend, therefore, if our subscribers cannot find what they want in our Directory that they communicate with the dealers whose names appear herewith.

MACHINE TOOLS AND METAL WORKING EQUIPMENT

Chas. P. Archibald & Co., Montreal, Que.
The Canadian Fairbanks-Morse Co., Montreal, Que.
The Garlock-Walker Machinery Co., Toronto, Ont.
R. S. Holly, Toronto, Ont.
H. W. Petrie Limited, Toronto, Ont.
The Standard Equipment & Tool Co., Montreal, Que.
Chas. A. Strelinger Co. of Canada Limited, Windsor, Ont.
A. R. Williams Machinery Co., Toronto, Ont.
A. R. Williams Machinery Co., Montreal, Que.
Wilson-McGovern Limited, Toronto Ont.
Yeates Machinery Co., London, Ont.

MACHINE SHOP AND FACTORY SUPPLIES

Chas. P. Archibald & Co., Montreal Que.
The Canadian Fairbanks-Morse Co., Montreal, Que.
The Garlock-Walker Machinery Co., Toronto, Ont.
R. S. Holly, Toronto, Ont.
H. W. Petrie Limited, Toronto, Ont.
The Standard Equipment & Tool Co., Montreal, Que.
Chas. A. Strelinger Co. of Canada Limited, Windsor, Ont.
A. R. Williams Machinery Co., Toronto, Ont.
A. R. Williams Machinery Co., Montreal, Que.
Wilson-McGovern Limited, Toronto Ont.
Yeates Machinery Co., London, Ont.

POWER EQUIPMENT AND SUPPLIES

The Canadian Fairbanks-Morse Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
H. W. Petrie Limited, Toronto, Ont.
The Standard Equipment & Tool Co Montreal, Que.
Wilson-McGovern Limited, Toronto, Ont.
A. R. Williams Machinery Co., Montreal, Que.

WOODWORKING MACHINERY

Chas. P. Archibald & Co., Montreal, Que.
The Canadian Fairbanks-Morse Co., Montreal, Que.
The Garlock-Walker Machinery Co., Toronto, Ont.
R. S. Holly, Toronto, Ont.
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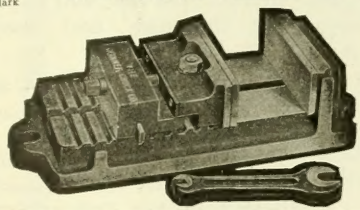

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